CHANGES IN SOIL SALINITY LEVELS WITH THE USE OF RECYCLED WATER ON COOL SEASON VEGETABLES

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ABSTRACT

Changes in Soil Salinity Levels with the Use of Recycled Water on Cool Season Vegetables

Dana Cameron Ripley

Agricultural production in Monterey County, California is a multi-billion dollar industry. Near the coast, seawater intrusion has threatened to degrade the groundwater quality due to over-pumping of the aquifer. The Monterey Regional Water Pollution Control Agency (MRWPCA), in partnership with the Monterey County Water Resources Agency, has provided recycled water since 1998 to over 12,000 acres of prime agricultural farmland in the northern Salinas Valley in an effort to reduce groundwater removal. The dominant soil types in the region are clay loam and clay soils, which are both susceptible to sodium (Na) accumulation and water infiltration problems. Recycled water blended with well water is used to irrigate cool season vegetables (i.e., artichokes, broccoli, Brussels sprouts, celery, cauliflower, and lettuce) and strawberries. A long-term study was implemented by MRWPCA to monitor salinity levels in commercial vegetable fields because of grower concerns that salts in the recycled water would have long term effects on soil quality. Accumulation of salts over time would make the soil less productive. Soil salinity levels were monitored at three Control and three Test Sites beginning in the spring of 2000. The Control Sites received well water, and the adjacent Test Sites received an approximate 2:1 blend of recycled and well water, respectively. Control and Test Sites were paired based on location to compare the same soil, crop, drainage systems, and farming practices. The soil was sampled three times per year from all sites: spring (before planting), mid-summer after harvest of the first crop, and late fall after the second crop harvest. Composites of four cores were collected at each site from the zero to 36-inch depth at 12-inch intervals. Each 12-inch interval soil sample was analyzed for pH, electrical conductivity (EC_e), extractable cations (Na^+, Ca^{2+}, Mg^{2+}, and K^+) and extractable anions (Cl^-, NO_3^-, and SO_4^-). After 10 years of monitoring, the data showed that using recycled water blended with well water at the Test Sites increased the EC_e of the soil profile from 2.1 to 2.5 dS/m and increased the sodium adsorption ratio (SAR) from 3.0 to 3.9. The data also showed that using well water at the Control Sites increased the EC_e of the soil profile from 1.4 to 2.6 dS/m and the change in SAR was negligible. The Test and Control Sites were significantly different for EC_e and SAR, which was expected considering a higher salt content in the recycled water compared to the well water. The significant differences for EC_e and SAR were associated with the significant differences in soil Na^+ levels between the Test and Control Sites. The SAR and EC_e of soil samples from all sites were in a range acceptable for vegetable production. The use of recycled water for irrigation of cool season vegetables and strawberries in the study area has not shown an indication of degraded soil productivity. Based on vegetable production and the slow increase of salts in the soil, recycled water can be used for long-term irrigation with proper management.

Keywords: Recycled water, soil salinity, and sodium (Na^+).

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1.0 INTRODUCTION

The Monterey County Water Recycling Projects (MCWRP), operated by Monterey Regional Water Pollution Control Agency (MRWPCA), started delivering recycled water for irrigation in Castroville, California in April 1998. The recycled water is tertiary treated domestic sewage that meets the California Department of Public Health, Title 22 of the Code of Regulations on Water Recycling Criteria. According to Title 22, "disinfected tertiary recycled water" (recycled water) used for surface irrigation of food crops, including all edible root crops, can come into contact with the edible portion of the crop (CDPH, 2009).

The groundwater quality was degrading due to excessive groundwater withdrawal for agriculture in the northern Salinas Valley in the 1970s (Figure 1). The groundwater withdrawal was increasing seawater intrusion and threatening a multibillion dollar agricultural industry. A group of community leaders in Monterey County were interested in using recycled water for irrigation, which led to the Monterey Wastewater Reclamation Study for Agriculture, an 11-year study beginning in 1976. The study proved that irrigating raw-eaten food crops with recycled water was safe and acceptable regarding pathogens, heavy metals, and crop quality and yield (Engineering-Science, 1987).

A Regional Treatment Plant (RTP) was constructed and began operating in 1990 where the farmlands were experiencing the worst seawater intrusion, near Marina, California. The RTP replaced eight wastewater treatment facilities in northern Monterey County. The source of the wastewater is sanitary sewage from local municipalities including Pacific Grove, Monterey, Del Rey Oaks, Seaside, Sand City, the former Fort Ord, Marina, Castroville, Moss Landing, Salinas, and unincorporated parts of northern Monterey County (Figure 2). The RTP was eventually upgraded to include the tertiary treatment process to produce recycled water for the irrigation of food crops by 1998.

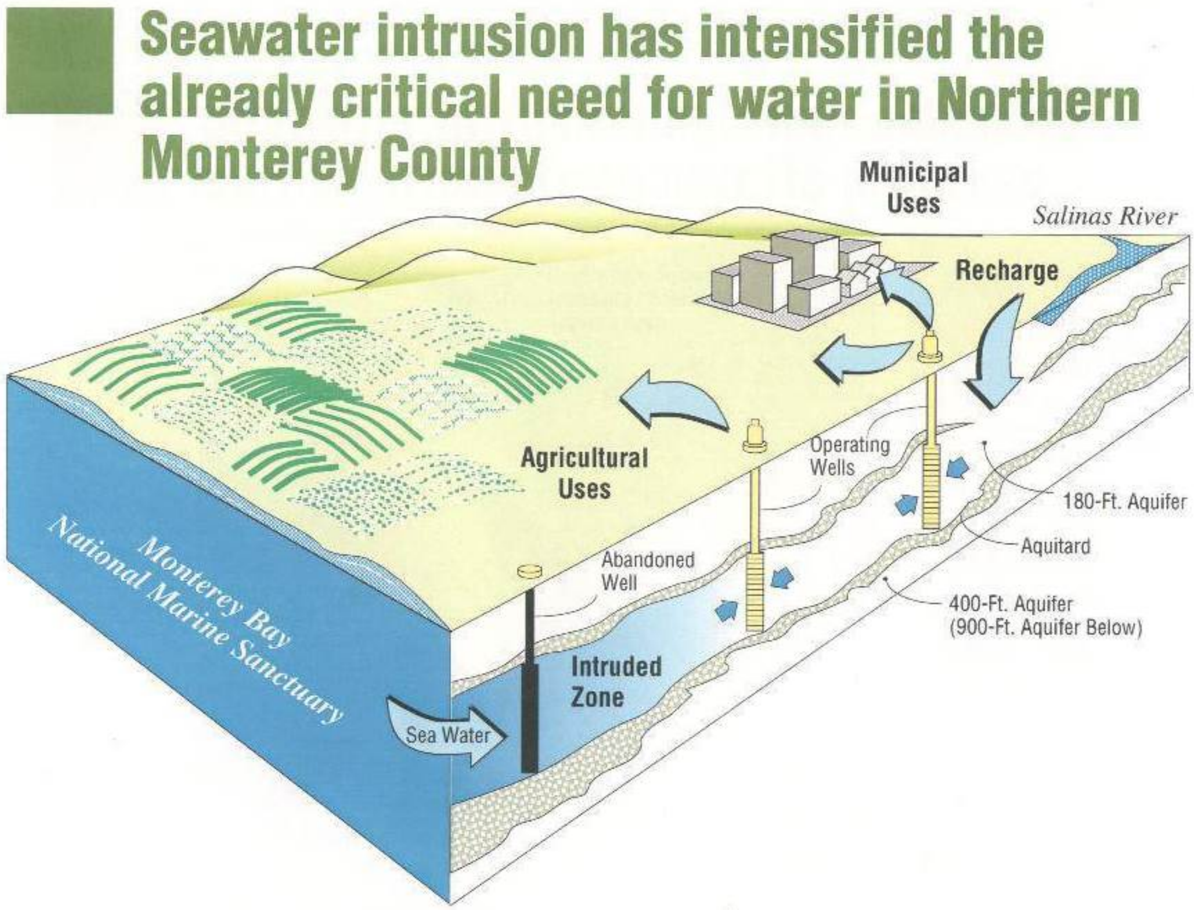

Figure 1. Seawater intrusion from excessive groundwater withdrawal for agriculture (MRWPCA, 2013a).

Recycled water has been used and accepted by the majority of growers in the area, but there were concerns with the possibility of deterioration of soil physical and chemical properties from the long-term use of recycled water. The recycled water from the RTP with an average sodium adsorption ratio (SAR) of 4.9 and an EC_w (measure of total salt in water) of around 1.6 dS/m is safe for long-term irrigation according to agronomic standards (Hanson et al., 1999). Increasing SAR can decrease water infiltration, soil permeability, and water retention. Fine-textured soils, such as clay and clay loam, have smaller particle sizes and pore spaces with more surface area compared to coarse-textured soils (sandy); therefore, clay soils have high water retention, slow drainage, and retain salts more effectively than sandy soils. The management of clay and clay loam soils in the MCWRP service area has been an ongoing challenge for the growers due to their ability to accumulate salts. Also, many of the cool season vegetables and strawberries grown in the area are salt sensitive, and the crop yields may decrease with increasing soil salinity (CPHA, 2002).

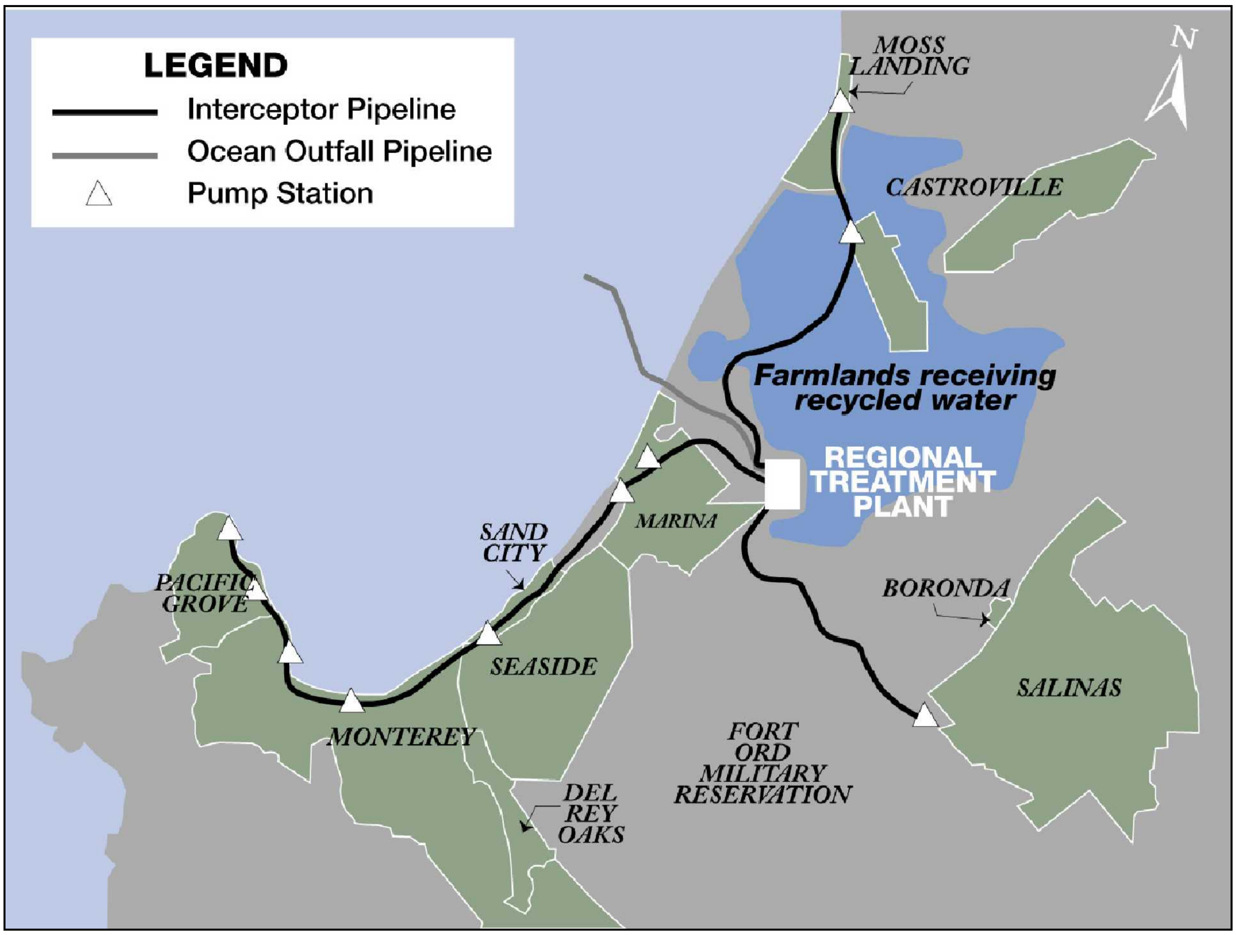

Figure 2. MCWRP service area and wastewater from local municipalities (Courtesy of MRWPCA).

The objective of this study was to determine the effects of recycled water on soil salinity levels for cool season vegetables and strawberries in Castroville, California; more specifically, to determine if the long term use of recycled water increased soil salinity and threatened soil productivity. The Control and Test Sites were selected based on soil characteristics and stratification, drainage system, type of crops grown, irrigation method, and farming practices. The Control Sites were chosen to be paired to the corresponding Test Sites to assure similarity. The trends of the salts were analyzed at different locations and soil depths from 2000 to 2009 for the Control Sites using well water and for the Test Sites using an approximate 2:1 blend of recycled and well water, respectively. The salt data studied from the composite soil samples consisted of the SAR, EC_e, ESP, Na^+, Ca^{2+}, Mg^{2+}, and Cl^-. The salt trend movements and their quantities in the soil profile, with emphasis on Na^+, were assessed.

2.0 LITERATURE REVIEW

2.1 Introduction

Fresh water used for agriculture is becoming an increasingly scarce resource because of droughts, climate change, and population growth. Agricultural production relies on an adequate and reliable source of water to be profitable. Using treated domestic wastewater (recycled water) for agricultural irrigation is becoming a common practice due to water shortages in arid and semi-arid regions (Asano et al., 2007).

California's Water Recycling Criteria, used as guidelines by other states and many countries for water reuse regulations, specifies the uses of recycled water, including the irrigation of all types of food crops (CDPH, 2009). These regulations define the different water quality requirements for irrigation of each type of crop, but do not have standards for total dissolved solids (TDS) or electrical conductivity (EC), which are measures of salinity. Also, there are no requirements for sodium adsorption ratio (SAR), which determines the potential sodium accumulation and likelihood of water infiltration problems. Recycled water can be excessively saline and harmful to food crops if not managed properly (Asano et al., 2007).

Groundwater, surface water, or recycled water used for agricultural irrigation can increase the amount of salts applied to the soil. In dry regions, groundwater and surface water are typically high in salts because they have flowed through soils containing large amounts of weathered minerals (Jalai et al., 2008). Also, the greater evaporation in a drier climate increases the amount of irrigation water required. Salts in recycled water can come from sodium chloride ($NaCl$) water softeners, or saline groundwater infiltrating into submerged wastewater collection pipelines. Soil hydraulic properties can be affected by long-term recycled water irrigation from changes in chemical and physical properties associated with the movement and accumulation of salts. Soil salinity is one of the most important site selection criteria because salts accumulate over time in direct proportion to the rate they are applied with irrigation water (Poole et al., 2004).

The salts in irrigation water primarily consist of chloride (Cl^-), sulfate (SO_4^{2-}), carbonate (CO_3^{2-}), bicarbonate (HCO_3^-), calcium (Ca^{2+}), magnesium (Mg^{2+}), potassium (K^+), and sodium (Na^+). Salinity can improve soil structure, but excess amounts of salt can reduce plant available water, limit nutrient uptake, and cause specific ion toxicities. Sodic irrigation water (high Na^+ concentration relative to divalent cations) can deteriorate soil structure, and reduce infiltration and hydraulic conductivity. Irrigating with highly saline and sodic water can be problematic depending on the type and amount of salts, soil texture, plant species and growth stage, and drainage (FAO, 1997).

The objective of this literature review was to determine the effects of salts (with emphasis on Na^+) in recycled water on soil salinity and on soil quality. Soil salinity is discussed in this chapter related to chemical and physical changes in the soil, the movement of salts in the soil, the interaction of the SAR and EC, calcareous soils, and soil texture and structure.

2.2 Recycled Water Quality

Tertiary and secondary treated wastewaters are both considered "recycled water" and can be used for agricultural irrigation. The California Department of Public Health, Title 22 of the Code of Regulations on Water Recycling Criteria has more restrictions for the use of secondary than tertiary treated wastewater. According to Title 22, "disinfected tertiary recycled water" (recycled water) used for surface irrigation of food crops, including all edible root crops, can come into contact with the edible portion of the crop. Secondary treated recycled water used for surface irrigation cannot contact the edible portion of food crops produced above ground (CDPH, 2009).

Secondary wastewater treatment is a biological process removing most of the suspended, colloidal, and dissolved organic matter. Secondary treatment usually includes disinfection as a final stage of the treatment process. Tertiary wastewater treatment consists of filtration and disinfection processes following secondary wastewater treatment, further reducing particulate and organic matter (Tchobanoglous et al., 2003). The dissolved mineral salts in recycled water can be removed with reverse osmosis (advanced treatment), but its use can be discouraging because of high costs to implement and operate, energy consumption, and brine management. Increased management to prevent salts from entering the wastewater treatment system and source reduction are less costly alternatives to advanced treatment. Also, beneficial nutrients for crops in the recycled water would be removed with advanced treatment (Asano et al., 2007).

The dissolved mineral salts contained in recycled water can be measured as EC in units of decisiemens per meter (dS/m) or TDS in units of milligrams per liter (mg/L). Both parameters are a measurement of total salt content, which include cations such as Na^+, Ca^{2+}, Mg^{2+}, K^+, NH_4^+, and H^+, and anions such as NO_3^-, SO_4^{2-}, Cl^-, HCO_3^-, CO_3^{2-}, and OH^-. Soil solution and recycled water exchangeable sodium (Na^+) are measured with the SAR and the exchangeable sodium percentage (ESP), respectively. The SAR (sodicity, Equation 2.1) is the proportion of soluble Na^+ relative to the soluble Ca^{2+} and Mg^{2+}, the ionic concentrations are expressed as milliequivalents per liter (meq/L) (Brady and Weil, 2004).

$$SAR = [Na^+]/\sqrt{([Ca^{2+}]+[Mg^{2+}])/2} \qquad [2.1]$$

The ESP (Equation 2.2) is the percentage of exchangeable Na^+ relative to the total exchangeable cations. The cation exchange capacity (CEC) is the total quantity of exchangeable cations that a soil can adsorb. The ionic concentrations are expressed as centimoles of charge per 1 kilogram ($cmol_c/kg$).

$$ESP = ([Na^+]/[CEC])*100 \qquad [2.2]$$

The guidance manual on irrigation with recycled water adapted the water quality guidelines for agricultural irrigation from the Food and Agriculture Organization (FAO) of the United Nations (Pettygrove and Asano, 1986). Table 1 presents the FAO water quality guidelines that are used internationally for agricultural irrigation and nationally for recycled water irrigation of crops and landscapes (Ayers and Westcot, 1985; Tanji et al., 2006).

The FAO water quality guidelines cover many conditions encountered in agricultural irrigation and water quality was evaluated on the “degree of restriction on use.” More intensive management to safely use irrigation water is required as water quality is degraded. These guidelines are to approximate the suitability of water for irrigation. Moreover, modifications are needed for local conditions because these guidelines are not plant specific. The guidelines are based on assumed yield potential, site conditions, methods and timing of irrigation, water uptake by crops, and restriction on use (Ayers and Westcot, 1985; Tanji et al., 2006).

No restrictions on recycled water use indicate crops can be produced at full capacity of their yield potential without the need for specific management practices. Restrictions on recycled water use indicate the crop selection may be limited or specific management practices are needed to obtain full crop production capacity (Ayers and Westcot, 1985; Tanji et al., 2006).

The site conditions for soil texture range from sandy loam to clay loam with well drained soils and a shallow water table within 7 feet of the land surface. Climatic conditions are semiarid to arid and low rainfall. Rainfall contributes only a small amount to meet crop water demand or to meet the leaching requirement (LR) (see Section 2.5.1.2) of crops (Ayers and Westcot, 1985; Tanji et al., 2006).

Sprinkler irrigation methods are used for methods and timing of irrigation. Irrigation water is applied when available soil water (for crop use) depletion is less than 50 percent (%) before the next irrigation. The leaching fraction (LF) (see Section 2.5.1.2) is 0.15 or greater (Ayers and Westcot, 1985; Tanji et al., 2006).

Table 1. Guidelines for interpreting recycled water quality for irrigation (Ayers and Westcot, 1985).

Potential irrigated problem	Units	Degree of restriction on use		
		None	Slight to moderate	Severe
Salinity (affects crop water availability)				
EC_w	dS/m	<0.7	0.7–3.0	>3.0
TDS	mg/L	<450	450–2,000	>2,000
Infiltration (affects infiltration rate of water into the soil)				
SAR[a] = 0-3, and EC_w =	$(meq/L)^{0.5a}$	>0.7	0.7–0.2	<0.2
SAR = 3-6, and EC_w =		>1.2	1.2–0.3	<0.3
SAR = 6-12, and EC_w =		>1.9	1.9–0.5	<0.5
SAR = 12-20, and EC_w =		>2.9	2.9–1.3	<1.3
SAR = 20-40, and EC_w =		>5.0	5.0–2.9	<2.9
Specific ion toxicity (affects sensitive crops)				
Sodium (Na)				
Surface irrigation, SAR	$(meq/L)^{0.5}$	<3	3-9	>9
Sprinkler irrigation, Na^+	mg/L	69	>69	
Chloride (Cl)				
Surface irrigation, Cl^-	mg/L	<142	142–355	>355
Sprinkler irrigation, Cl^-	mg/L	<106	>106	
Boron (B)	mg/L	<0.7	0.7–3.0	>3.0
Trace elements (see Table IV.C.5)				
Miscellaneous effects (affects susceptible crops)				
Nitrogen, NO_3-N	mg/L	<5	5–30	>30
Bicarbonate (HCO_3)	mg/L	92	92–518	>518
pH	No problems expected with normal pH range of 6.5–8.4			
Residual chlorine[a] (overhead sprinkling only)	mg/L	<1	1–5	>5

[a]Added by (Pettygrove and Asano, 1986).

The root zone is divided into four layers for water uptake by crops assuming that crops extract soil water to meet their seasonal evapotranspiration with a 40, 30, 20, and 10 percent water extraction pattern (Figure 6) (Ayers and Westcot, 1985). The leaching of salts in the upper root zone and accumulation of salts in the bottom root zone results with each irrigation event. Based on a steady-state LF of 15 to 20 %, the average root zone salinity in soil water (EC_{SW}) is estimated to be three times greater than salinity in the applied irrigation water (EC_W), and the soil paste extract (EC_e) (see Section 2.5.1) is estimated to be 1.5 times EC_W (Ayers and Westcot, 1985; Tanji et al., 2006).

The three categories for the degree of restriction on use were based on studies, observations, and experiences in the field. In Table 1, a change of 10 to 20 % above or below a value may have little consequence on crop yield if other values have little to no restrictions on use. Furthermore, the management skill of the grower could change the restriction on use (Ayers and Westcot, 1985; Tanji et al., 2006).

2.3 Soil Chemical Properties Influenced by Sodium

2.3.1 Cation Exchange Capacity

CEC is an important soil chemical property used for soil classification, assessing soil fertility, and soil behavior in natural and altered conditions. CEC is the ability of a soil to retain plant nutrients, where clay particles and organic matter have negatively charged sites that attract positively charged ions to their surfaces. CEC is influenced by many factors: hydrated charge density (HCD), hydrated radius, electronegativity, charge, texture, mineralogy, organic matter, and pH (Hanson et al., 1999; Brady and Weil, 2004; Renault et al., 2009).

The HCD equals ion charge divided by the hydrated radius. Na^+ has a low hydrated charge density and large hydrated radius; therefore, clay particles hold Na^+ loosely due to their lower ion charge (Hanson et al., 1999). An excess amount of adsorbed Na^+ on the negatively charged exchange sites causes colloids and organic matter to disperse (Tanji et al., 2006). Ca^{2+} and Mg^{2+} have a higher hydrated charge density and smaller hydrated radius; therefore, Ca^{2+} and Mg^{2+} are tightly held on the particle surface and adsorb strongly to clays, inducing flocculation (Renault et al., 2009).

Increasing electronegativity increases chemisorption of a cation because the cation can pull more oxygen-bonding electrons toward itself more strongly. Ca^{2+} and Mg^{2+} each have a higher electronegativity compared to Na^+; Ca^{2+} and Mg^{2+} are held on the soil particle surface more tightly compared to Na^+ (Renault et al., 2009).

Soil organic matter exerts a large influence on pH-dependent charge on soils. As the pH increases, the OH^- functional groups deprotonate, producing more negative surface charge. The build-up of negative charge disperses the soil organic matter. Sodic soils have a pH greater than 8.5 due to sodium carbonate (Na_2CO_3) being more soluble than calcium carbonate ($CaCO_3$) and magnesium carbonate ($MgCO_3$); therefore, high concentrations of CO_3^{2-} and HCO_3^- are maintained in the soil water (Brady and Weil, 2004). Elevated carbonate concentrations in soil water can lead to plugging of soil pores with soils having a low surface area (Tanji et al., 2006).

Crystalline silicate clays are the prevalent type in most soils and are mainly negatively charged, but are different regarding their particle shapes, charge intensity, stickiness, plasticity, and swelling behavior. Crystalline silicate clays can be categorized by their layered structure into two main groups: 1:1 silicate clays and 2:1 silicate clays (Brady and Weil, 2004). The negative charge of 1:1 silicate clays is dependent on pH and ionic strength because of protonation and de-protonation. Kaolinite is the most common 1:1 silicate clay with a low CEC ranging from 1 to 15 $cmol_c/kg$. The negative charge of 2:1 silicate clays is independent of pH and ionic strength because the charge results from isomorphous substitution of the cations in the mineral structure. Illite is a 2:1 silicate clay with a CEC between 10 to 40 $cmol_c$/kg, which is smaller than smectite, but higher than kaolinite. Smectite is a 2:1 silicate clay with a high CEC between 80 to150 $cmol_c$/kg. Compared to kaolinite and illite, smectites have a larger surface area and higher capacity to adsorb more exchangeable cations and water molecules; therefore, more exchangeable Na^+ can be retained on the exchange sites of smectite clays (Brady and Weil, 2004).

2.3.2 Chemical Reactions of Salts in Soil Water

The main chemical reactions that affect soil salinity are the dissolution and precipitation of minerals, such as calcite ($CaCO_3$) and gypsum ($CaSO_4$*$2H_2O$), and the cation exchange between Na^+, Ca^{2+}, Mg^{2+}, NH_4^+, and K^+ in soluble form in the soil solution and their adsorbed form on the soil exchange complex (Tanji et al., 2006).

Soils containing soluble minerals contribute to the overall soil solution salinity when the minerals (i.e., $CaCO_3$ and feldspars (sodic-, calcic, and potassium silicates) are chemically weathered. $CaCO_3$ and feldspars each have a low solubility and contribute little to overall soil salinity compared to $CaSO_4$*$2H_2O$. $CaSO_4$*$2H_2O$ has a high solubility and can contribute high concentrations of Ca^{2+} and SO_4^{2-} ions. $CaSO_4$*$2H_2O$ is highly soluble in the presence of Na^+ and Mg^{2+} ions (Tanji, 2002). Ca^{2+} can replace Na^+ and Mg^{2+} on the soil exchange complex, which can improve the soil tilth and reduce the SAR of the soil. SO_4^{2-} can form the neutrally charged $MgSO_4$ ion pair and monovalently charged $NaSO_4^-$ ion pair. The solubility of $CaSO_4$*$2H_2O$ is raised to a higher level during ion pair reactions and cation exchange (Tanji et al., 2006).

2.4 Soil Physical Properties Influenced by Sodium

2.4.1 Aggregation

An aggregate is a cluster of soil particles containing clay, silt, sand, and sometimes rock fragments. Soil aggregation is the process of developing soil structure by aggregation or fragmentation. Fragmentation is the break-up of soil mass from the pressure exerted by growing roots, freeze-thaw cycles, shrink-swell cycles, and mechanical processes. Aggregation is the formation of smaller soil particles and micro-aggregates into larger ones by flocculation and cementation. Cementing agents that bind primary particles together include cohesion between water molecules in moist soils, roots, organic matter, soluble silica, carbonates, oxides, clay particles, and salts (Lal and Shukla, 2004).

Many factors are related to aggregate stability, including: soil texture, clay mineralogy, calcite, organic matter, microorganisms, soil management practices, and extractable and exchangeable cations. Divalent and trivalent cations tend to cluster closer to clay particles than Na^+ (Figure 3); greater amounts of divalent cations (i.e., Ca^{2+} and Mg^{2+}) and trivalent cations induce soil flocculation compared to Na^+. Ca^{2+} and Mg^{2+} compete with Na^+ for the same CEC sites to bind clay particles (Hanson et al., 1999).

A soil having a strong structure and stable aggregates indicate a good physical condition allowing sufficient root penetration and water infiltration. Aggregate size distribution and aggregate stability are used as measures of soil quality, and greater aggregate stability has been related to increased soil productivity. Higher soil aggregation increases its water holding ability, resistance to erosion, suitability for plant growth, and soil permeability (Caravaca et al., 2001).

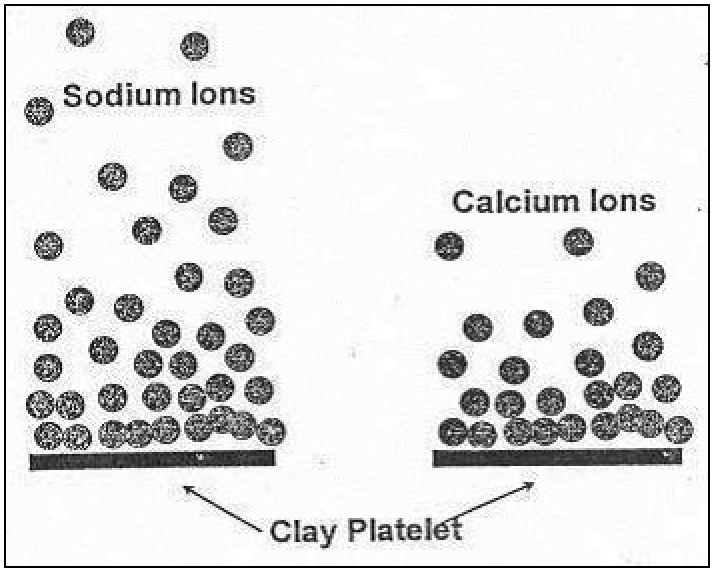

Figure 3. Sodium and calcium behavior attached to clay particles (Hanson et al., 1999).

2.4.2 Soil Dispersion and Swelling

Dispersion and swelling occur when clays are repeatedly wetted and dried and then solidify into a cemented soil with a deteriorated structure. Soil dispersion and aggregate swelling are the physical processes associated with high Na^+ concentrations. Soil dispersion is a separation of soil aggregates into individual component particles. Excess Na^+ disrupts the forces binding clay particles together. The separation of clay particles causes expansion, which induces swelling and soil dispersion (Brady and Weil, 2004). The pore size is reduced when clays swell and the pores clog when the soil disperses, which reduces soil permeability (Chaudhari, 2001). Section 2.5.2 discusses Na-induced dispersion regarding infiltration, hydraulic conductivity, and surface crusting.

The swelling behaviors of crystalline silicate clays are different because of their interlayer spacing and surface area. The interlayers of 1:1 silicate clays are tightly bound together and no expansion occurs when the clay is wetted; therefore, 1:1 clays (e.g. kaolinite) have less plasticity, stickiness, cohesion, shrinkage, and swelling and hold less water than 2:1

silicate clays. The interlayers of non-expanding 2:1 silicate clays (e.g. illite) are strongly bound together and are more similar to kaolinite than smectites regarding their capacity to adsorb water and cations, and their low plasticity and stickiness. The soil's particles have a tendency to aggregate if the soil contains mostly kaolinite and illite. The interlayers of expanding 2:1 silicate clays (e.g. smectites) are loosely bound together and expand as water pushes the layers apart; this interlayer expansion contributes to the very high degree of plasticity, stickiness, cohesion, shrinkage, and swelling. The soil's particles have a tendency to swell, separate, and disperse if the soil contains mostly smectite clays (Brady and Weil, 2004).

2.5 Salt-Affected Soils

2.5.1 Saline Soils

Soils become saline by natural processes, anthropogenic activity, or both. The natural process producing dissolved mineral salts is the geochemical weathering of rocks, sediments, and soil minerals. Also, in coastal zones, some soils are saline because they are sprayed by seawater. Salts contributions also come from are also contributed from agricultural irrigation, gypsum, sulfuric acid, animal manure, and biosolids (Tanji et al., 2006).

Saline soils contain an excessive amount of salinity having and have electrical conductivity of soil paste extract (EC_e) greater than 4 dS/m (Table 2), where the plant available soil water is reduced by osmotic effects because plants must use more energy to draw soil water from saline soil solutions than from non-saline soil solutions (Tanji et al., 2006). Excessive salinity in soil water can cause the plant symptoms of wilting and plant stress from insufficient water, stunted growth, damaged leaves, and death (Lauchli and Epstein, 1990). Plant growth in saline soils is generally not limited by poor infiltration, aggregate stability, or aeration because soluble salts can improve the soil structure by enhancing aggregation and preventing dispersion of soil colloids (Brady and Weil, 2004).

Table 2. Classification of salt-affected soils and distinguishing properties (Richards, 1954).

Class	pH	EC_e (dS/m)	SAR	ESP (%)
Nonsaline	<8.5	<4	<13	<15
Saline	<8.5	>4	<13	<15
Sodic	>8.5	<4	>13	>15
Saline-sodic	<8.5	>4	>13	>15

Saline soils have an ESP less than 15 and an SAR less than 13 (Table 2); therefore, Ca^{2+} and Mg^{2+} dominate the exchange complex in saline soils, not Na^{+} (Brady and Weil, 2004). Typically, saline soils are dominated by Na^{+}, Mg^{2+}, Cl^{-}, and SO_4^{2-} ions forming highly soluble salts that accumulate to high concentrations. In contrast, Ca^{2+}, HCO_3^{-}, and CO_3^{2-} ions form less soluble salts that accumulate less readily in saline soils (Tanji, 1990).

2.5.1.1 Methods of Measuring Soil Salinity

Measuring soil salinity can be difficult because of the constant changes occurring within a soil over time and space. Soil water content changes based on wetting and drying cycles where irrigation and rainfall replenishes and evapotranspiration depletes the soil water content. Furthermore, convective and dispersive movement by soil water flow and ion diffusion is responsible for the high mobility of dissolved mineral salts. Measuring soil salinity is a challenge because plant roots are exposed to dynamic temporal (time-related) and spatial (distance or size) changes in soil salinity (Tanji et al., 2006).

Methods to measure soil salinity include EC_e, mapping electrical conductivity of soil water (EC_{SW}) in the field, and electromagnetic induction (EM) to remotely sense EC_{SW}. The EC_e is an indirect measurement of the salt content, where a soil sample saturated with distilled water is mixed into a soil paste and then the EC of the extracted water is measured. Mapping EC_{SW} in the field involves inserting a four-electrode conductivity apparatus into moist soil to directly measure EC_{SW}. Salinity variation can be mapped if a global positioning system (GPS) is attached to the apparatus while salinity is measured at different locations within a given area. EM of electrical current (i.e., electrical conductivity) can be a measure of soil salinity, where a transmitter coil in the EM device generates a magnetic field within the soil. The magnetic field induces small electric currents that generate their own secondary magnetic fields, which can be measured by a receiving cell in the EM device; therefore, the EM device can measure EC_{SW} to considerable depths without probing the soil (Rhoades et al., 1999).

2.5.1.2 Soil Salinity Changes Based on Irrigation and Leaching Practices

Soil salinity in agriculture depends on the salinity of the irrigation water, irrigation system used, and the leaching fraction (LF) provided with each irrigation event or seasonally (FAO, 1997; Tanji et al., 2006). Salts tend to accumulate in the root zone of actively transpiring plants because pure water is lost to the atmosphere through evaporation and transpiration. The LF is one way to control the root zone salinity. The LF is the ratio of the depth of drainage water out of the root zone to the depth of infiltrated irrigation water in the root zone (Ayers and Westcot, 1985; Tanji et al., 2006). The soil depths near the surface become the zone of salt leaching and the lower soil depths become the zone of salt accumulation when water is applied uniformly (i.e., sprinkler and border irrigation) across the irrigated land (Tanji et al., 2006). The accumulation of salts in the lower depths of the root zone depends on the LF; the higher the LF, the less salt buildup in the soil. During furrow irrigation, salinity increases with soil depth in the bottom of the furrow and salts accumulate in the ridges between furrows. During drip irrigation, salt accumulates between the emitters and at the outside fringes of the wetted area. Figure 4 illustrates salt accumulation patterns using different irrigation methods (Ayers and Westcot, 1985).

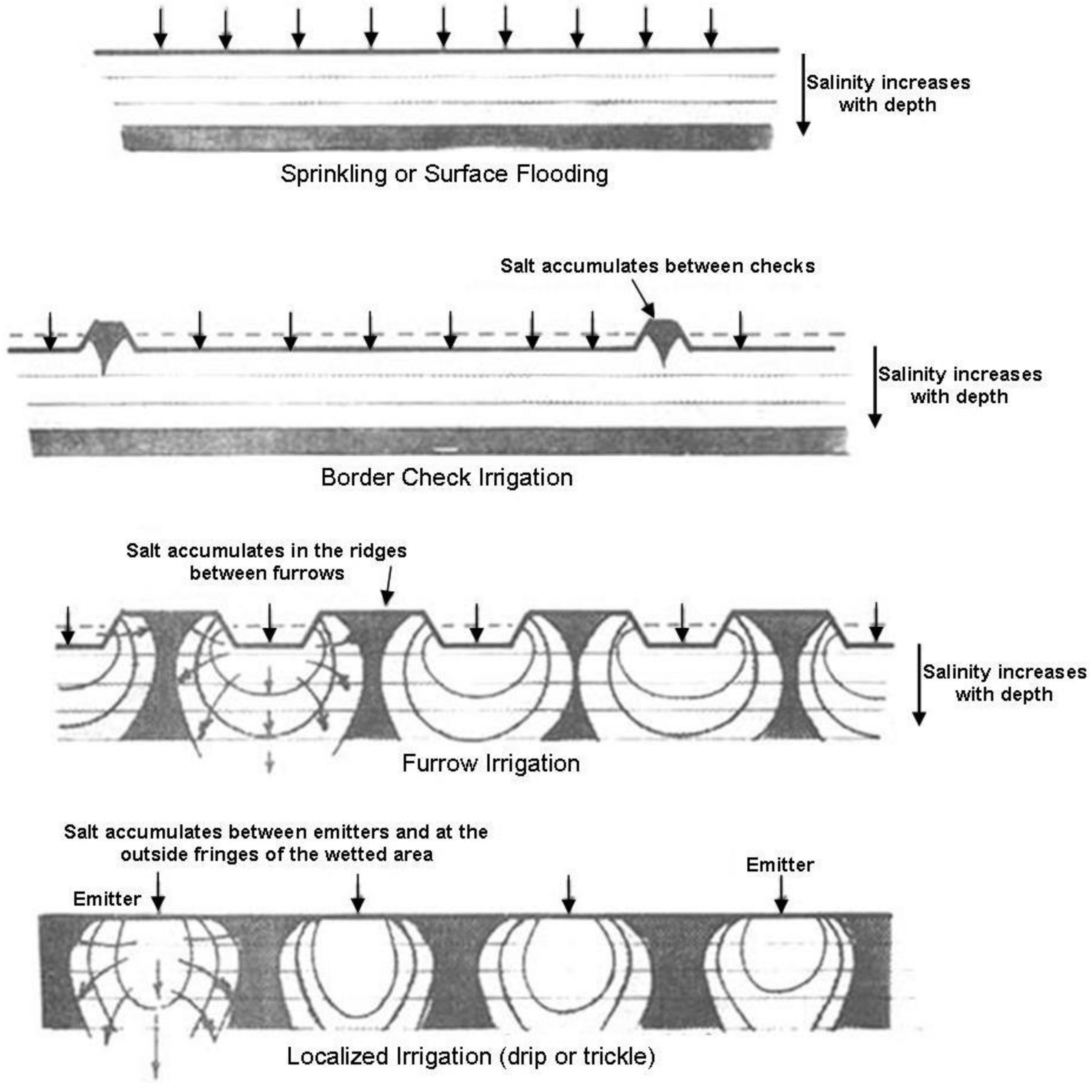

Figure 4. Salt accumulation patterns using different irrigation methods (Ayers and Westcot, 1985).

Salts accumulate in the wetted perimeter in most soils. Salts accumulate in the outer wetted edges with drip irrigation; therefore a greater application of drip irrigation will result in salt buildup away from the plant roots. In agricultural farming, sprinkler irrigation is used for an extended period to leach salts in the soil after drip irrigation (Hanson and Bendixson, 2004). Figure 5 illustrates different methods of surface and subsurface irrigation wetting patterns near the soil surface (FAO, 1997).

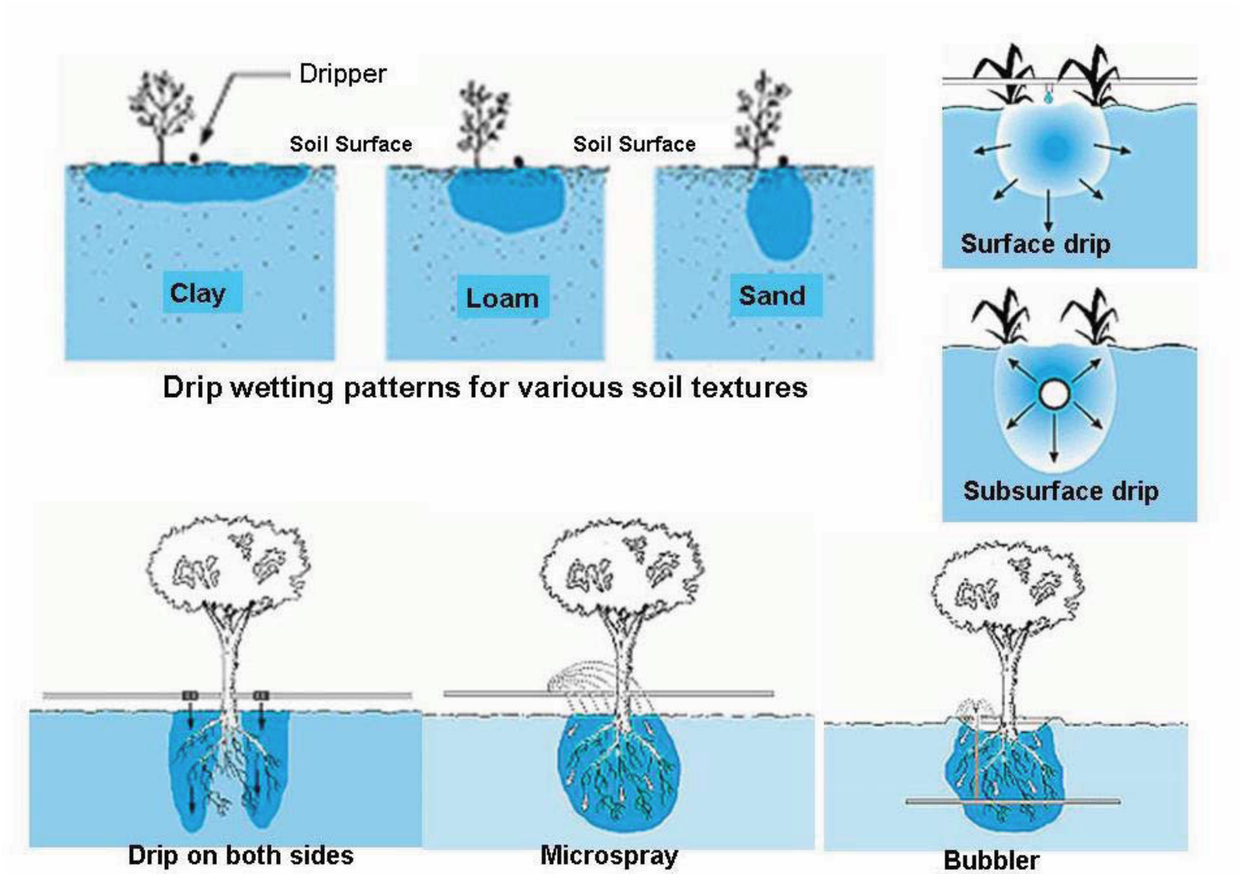

Figure 5. Wetting patterns with different irrigation methods (FAO, 1997).

Salt distribution varies in the soil depending on root water extraction and the rooting depth (Tanji et al., 2006). Figure 6 illustrates the root zone as four layers assuming that crop plants extract soil water to meet their seasonal evapotranspiration (ET) with a 40, 30, 20, and 10 % water extraction pattern (W_q). The leaching of salts in the upper root zone and accumulation of salts in the bottom root zone results with each irrigation event; the LF decreases and the EC_{SW} increases with depth (Ayers and Westcot, 1985; Tanji et al., 2006).

Based on a steady-state LF of 15 to 20 %, the average EC_{SW} in the root zone is estimated to be three times greater than salinity in the applied irrigation water (EC_W), and the EC_e is estimated to be 1.5 times EC_W. A LF of 15 to 20 % is more than adequate to maintain soil salinity levels below harmful levels for most plants (Ayers and Westcot, 1985).

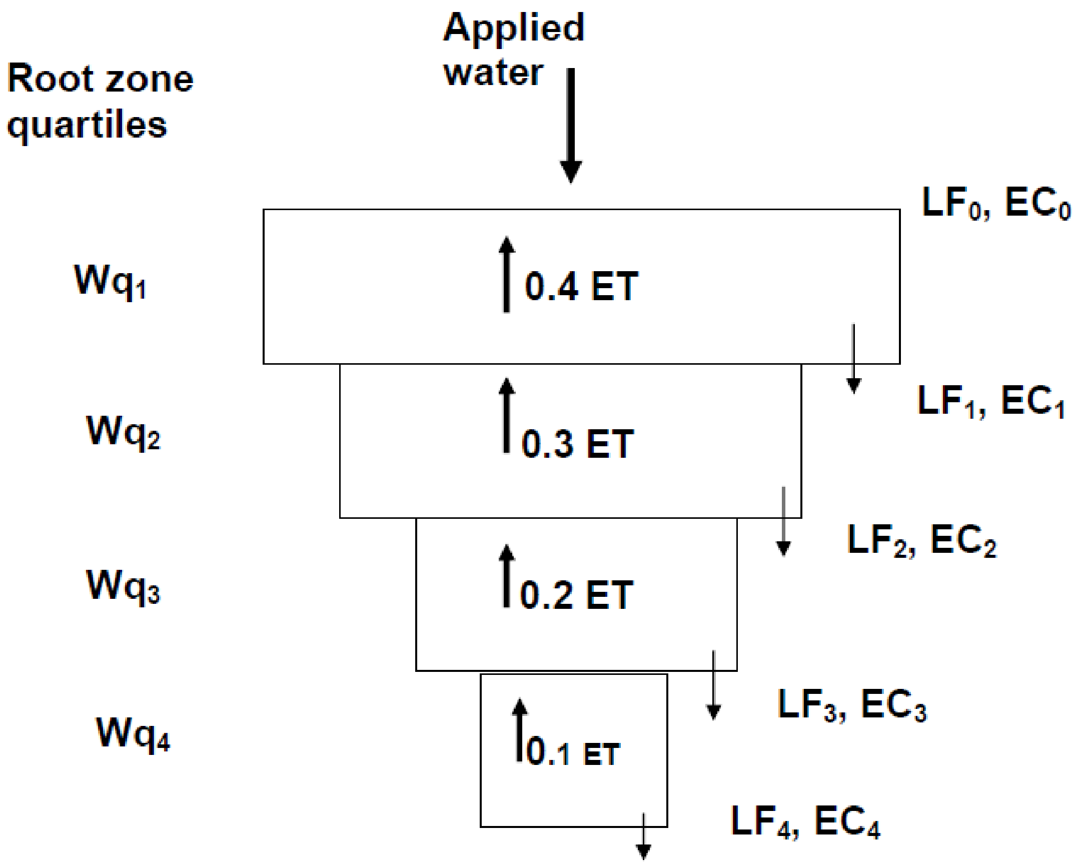

Figure 6. Crop root zone into four quartiles with a 40, 30, 20, and 10 % ET root water extraction pattern used to calculate LF and EC_{SW} for each quartile (Ayers and Westcot, 1985).

In drier regions with less rainfall, most of the salts in the irrigation water accumulate in the root zone because pure water is lost to evapotranspiration (Tanji et al., 2006). The salinity of a root zone can be maintained with the known LR considering the plant's salt tolerance threshold (Rhoades, 1972; Tanji et al., 2006). Salts in the root zone should be maintained below the maximum level tolerated by plants for the most favorable plant performance and to prevent osmotic stress. Excess salinity levels in the root zone can be avoided if an adequate amount of rainfall, irrigation, or both exceed the water holding capacity in the root zone and if soil water containing salts drains below the root zone (Tanji et al., 2006).

2.5.2 Sodic Soils

Sodic soils contain excessive levels of exchangeable (adsorbed) Na^+ on the soil exchange complex causing Na-induced Ca^{2+} deficiency, soil dispersion, and specific ion toxicity (Tanji et al., 2006). High ESP can be toxic to sensitive plants (Richards, 1954). Soils can become sodic by leaching saline soils with high Na^+ content water, causing excess ESP. In nonsaline conditions, sodium bicarbonate ($NaHCO_3$) can form from the chemical weathering of igneous rocks along with being subject to evapoconcentration from evapotranspiration, resulting in sodic soil conditions (Whittig and Janitsky, 1963).

Sodic soils have a pH greater than 8.5 due to sodium carbonate (Na_2CO_3) being more soluble than calcium carbonate ($CaCO_3$) and magnesium carbonate ($MgCO_3$); therefore, high concentrations of CO_3^{2-} and HCO_3^- are maintained in the soil water (Brady and Weil, 2004). Elevated carbonate concentrations in soil water can lead to plugging of sand pores because sands have less surface area compared to clays (Tanji et al., 2006).

Sodic soils have high levels of adsorbed Na^+ with ESP and SAR values greater than 15 and 13, respectively, and the EC_e is less than 4 dS/m (Table 2). High ESP or SAR, and soil pH cause clays and organic matter to disperse, which restricts infiltration and hydraulic conductivity, and promotes surface crusting. Soils with a slow intake of water at the surface and/or slow movement of water below the surface may have symptoms including stunted plants, plant wilting during summer months, ponding or runoff during irrigation and rainfall, poorly aerated soil, and soil dryness after long periods of irrigation (Oster et al., 1984).

Na-induced dispersion hardens the soil and impedes water infiltration at the surface; therefore, reduced infiltration from Na-induced dispersion decreases the plant available water, and increases runoff and soil erosion. A rainfall simulation study on soils irrigated with recycled water caused significant clay dispersion and reduced the infiltration rate because of the high ESP of the soil surface and the fast leaching of the soluble salt ions (Lado et al., 2005).

The hydraulic conductivity is reduced when Na-induced dispersion deteriorates the soil structure. Soils with a well-defined structure contain many macropores, cracks, and fissures allowing for ease of water flow through the soil. Dispersion decreases the pore size, reducing the hydraulic conductivity (Tarchitzky et al., 1999). If water cannot flow through the soil, then the upper soil layers can become waterlogged creating anaerobic conditions that reduce or prevent plant growth and lower organic matter decomposition rates. The decrease in decomposition produces a black mucky mat on the moist soil surface and infertile soil conditions (Tanji et al., 2006).

Surface crusting is caused by physical dispersion due to the impacts of rain or irrigation water and chemical dispersion depending on the EC_W and SAR of the applied water. Structural and depositional crusts are the two types of crusts impeding the water infiltration rate (Oster et al., 1984). Structural crusts form when raindrops and irrigation water wet and beat the soil causing the structure to collapse. The thin crust that forms when the soil dries decreases the number and size of macropores conducting water. Na-induced dispersion enhances surface crusting as clay particles disperse within the soil water. Depositional crusts are a residual layer of sediment on the soil's surface formed when sediment-laden water infiltrates the soil (Tanji et al., 2006).

2.5.2.1 Analyzing Sodium in the Soil

Figure 7 shows the relationship between the SAR and the ratio of exchangeable Na^+ to CEC minus exchangeable Na^+ at the saturation moisture percent for 59 soil samples from nine western United States. The correlation coefficient is high enough to use in practical applications.

Using the data in Figure 7, the relation between SAR and ESP can be determined by Equation 2.3 (Richards, 1954).

$$ESP = 100*[(SAR*0.01475)-0.0126]/1+[(SAR*0.01475)-0.0126] \qquad [2.3]$$

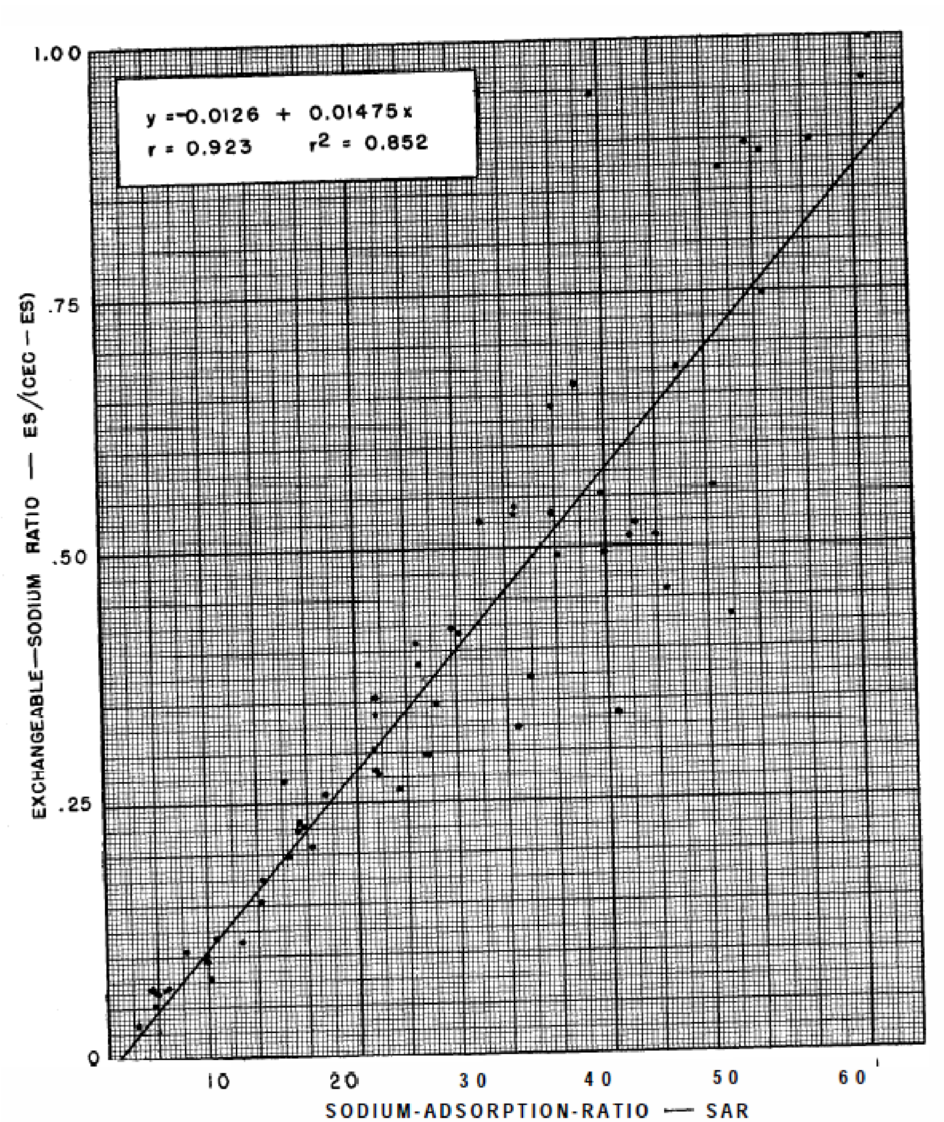

Figure 7. Relationship between the SAR and the ratio of exchangeable Na^+ (ES) to CEC minus exchangeable Na^+ (ES) of the soil paste extract (Richards, 1954).

Measuring ESP is time consuming, involving extraction of exchangeable and soluble Na^+, and determining the CEC. The SAR is a sodicity parameter widely used. The SAR is calculated using the soluble Na^+, Ca^{2+}, and Mg^{2+} in soil water extracted from a saturated soil paste. The nomograph in Figure 8 represents the empirical relation between the SAR in the soil water extract to the ESP on the soil exchange complex (Richards, 1954). An SAR value of 13 is equivalent to an ESP value of 15. The ESP scale in Figure 8 is based on the regression line in Figure 7.

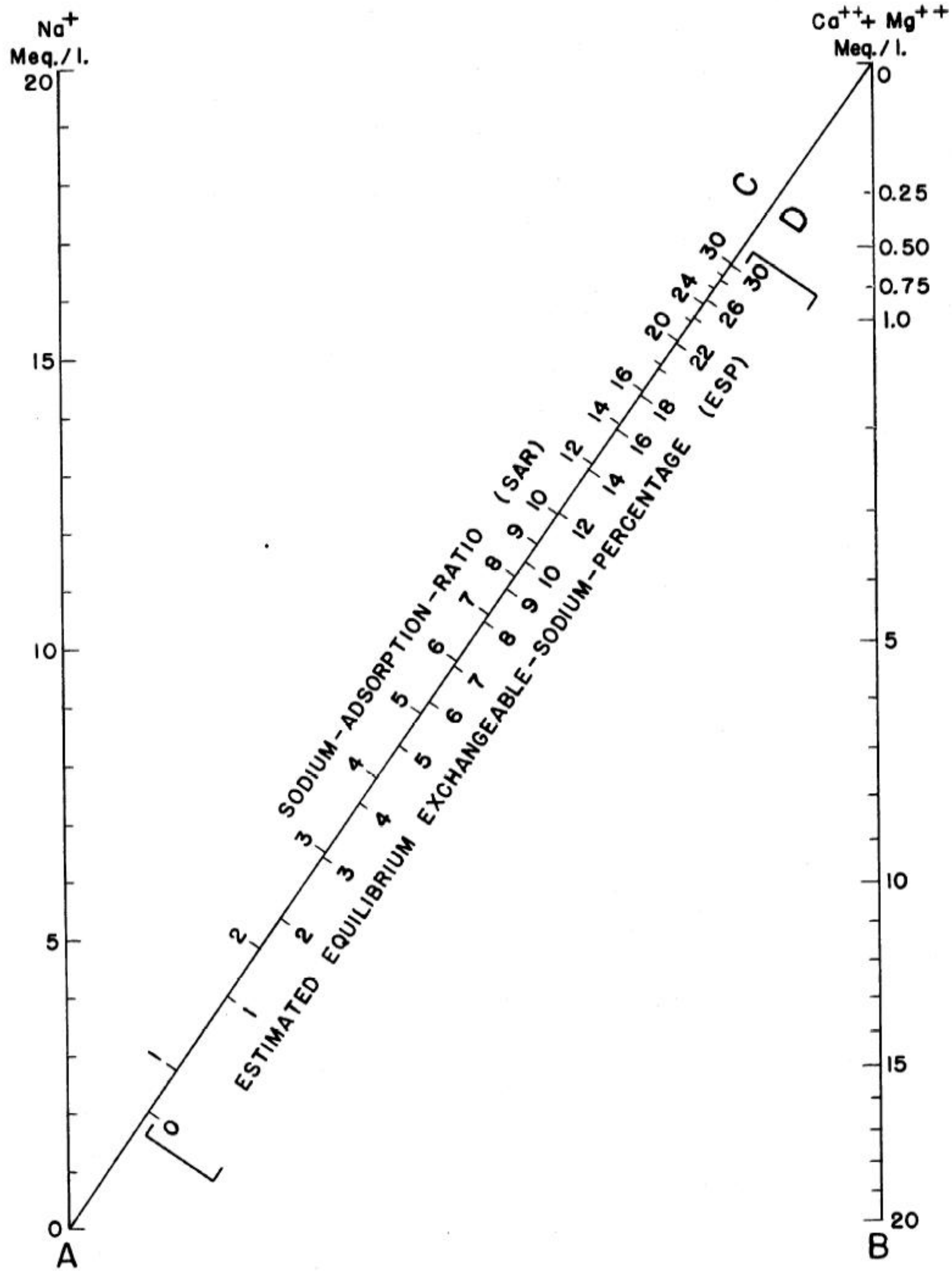

Figure 8. Nomograph for determining the SAR of a soil water extract and estimating the corresponding ESP of a soil (Richards, 1954).

2.5.2.2 Assessing Sodium Hazard (SAR)

Figure 9 assesses the Na^+ hazard (SAR) primarily on the changes of the soils' physical properties from exchangeable Na^+ accumulation on the cation exchange sites, and secondarily on specific ion toxicity of Na^+ (Richards, 1954). The accumulation of exchangeable Na^+ on the cation exchange complex is related to the SAR as discussed above. The U.S. Salinity Laboratory system for classifying irrigation water regarding the combined effects of SAR-EC in Figure 9 is outdated (Lunt, 1963). Currently, Figure 9 is used to evaluate only the exchangeable Na^+ hazard on plants and soils, and Figure 12 is used to evaluate the combined SAR-EC effects on soil permeability (Ayers and Westcot, 1985; Tanji et al., 2006).

The Na^+ hazard for irrigation water is classified by S1, S2, S3, and S4 (Figure 9). Low Na^+ hazard S1 irrigation water can be applied on almost all soils with minimal risk of accumulating detrimental levels of exchangeable Na^+. Medium Na^+ hazard S2 irrigation water can be applied to coarse-textured or organic soils with good permeability. But, irrigating with medium Na^+ hazard S2 water on fine-textured soils with high CEC and low LF will be harmful. The Na^+ hazard will be reduced if gypsum is in the soil; the exchangeable Na levels will be reduced from Ca^{2+} dissolved from gypsum. High Na^+ hazard S3 irrigation water can cause harmful levels of exchangeable Na^+ in most soils. Soils receiving S3 irrigation water require sufficient drainage, high leaching, and applications of organic matter. Also, chemical amendments may be needed to lower exchangeable Na^+ with S3 irrigation water. Very high Na^+ hazard S4 irrigation water is not usually suitable for irrigation (Richards, 1954).

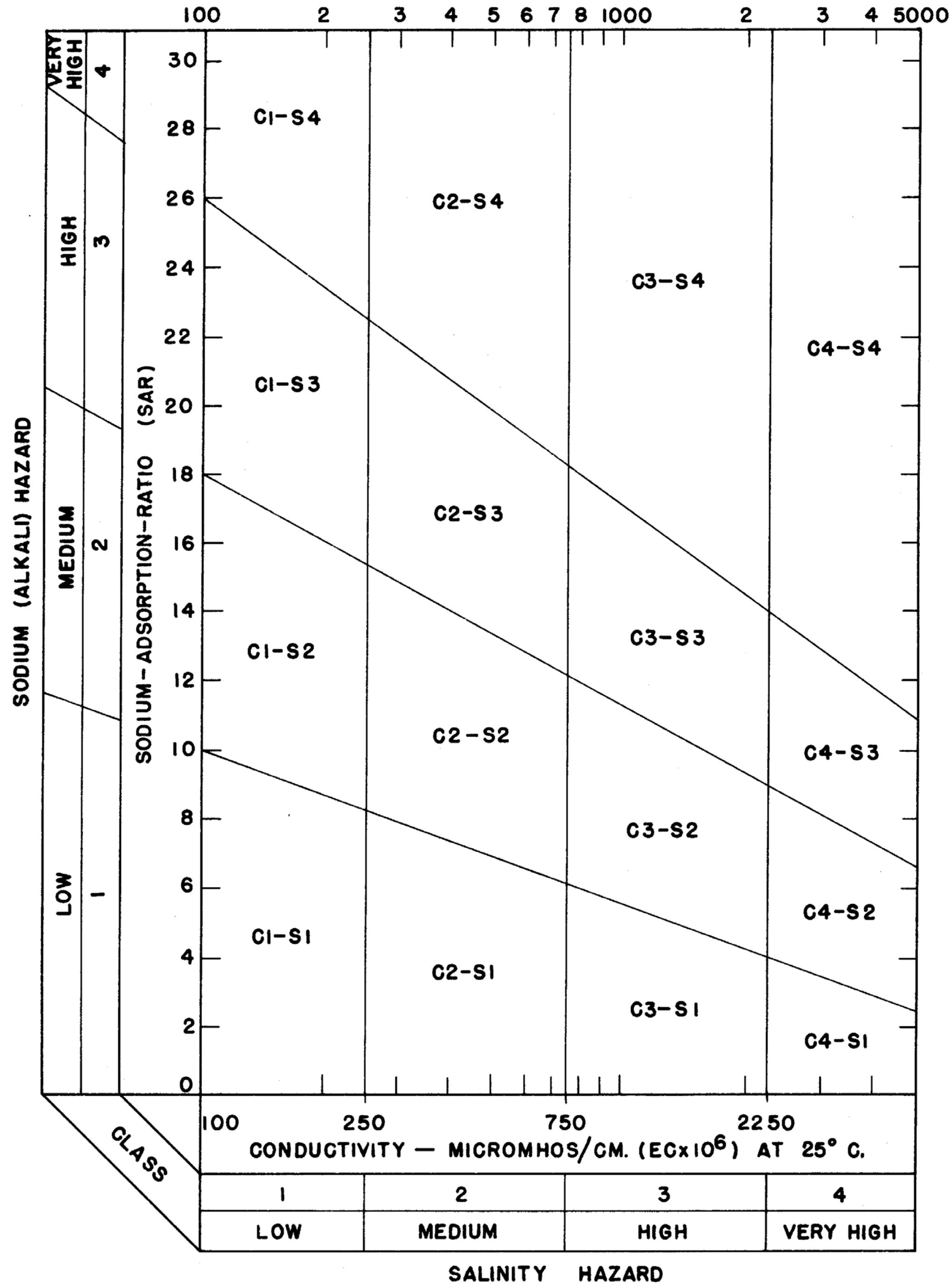

Figure 9. Classification of irrigation waters for assessing salinity hazard (E) and sodium hazard (S) (Richards, 1954).

2.6 Interaction of EC and SAR

2.6.1 Soil Swelling Influenced by EC and SAR

The ratio of salinity (EC_{SW}) to sodicity (SAR) in soil water can determine the amount a soil is expected to swell. The swelling factor predicts whether salinity-induced flocculation or Na^+-induced dispersion will more greatly change the soil physical properties. A method was developed for predicting the hydraulic conductivity of soils in saline and sodic solutions using calculated interlayer swelling values for montmorillonite (the most common smectite) as reference criteria for the predictions. Swelling values were determined based on a simplified domain model for assessing the exchangeable Na^+ and Ca^{2+} distribution with a group of montmorillonites (McNeal, 1968).

A line can be drawn from the Na content (adjusted ESP) of soil in the left column to EC_{SW} in the right column to determine the swelling factor in the middle column (Figure 10). As an example, the red line yields a swelling factor of 0.0041 using an adjusted ESP of 2 and an EC_{SW} of 4 meq/L, indicating dispersion is not a concern. As another example, the blue line yields a swelling factor of 0.28 using an adjusted ESP of 30 and an EC_{SW} of 2 meq/L, indicating dispersion is a concern. Figure 10 is intended to show how the salinity in irrigation water (EC_W) can reduce dispersion in soils with a high ESP (McNeal, 1968).

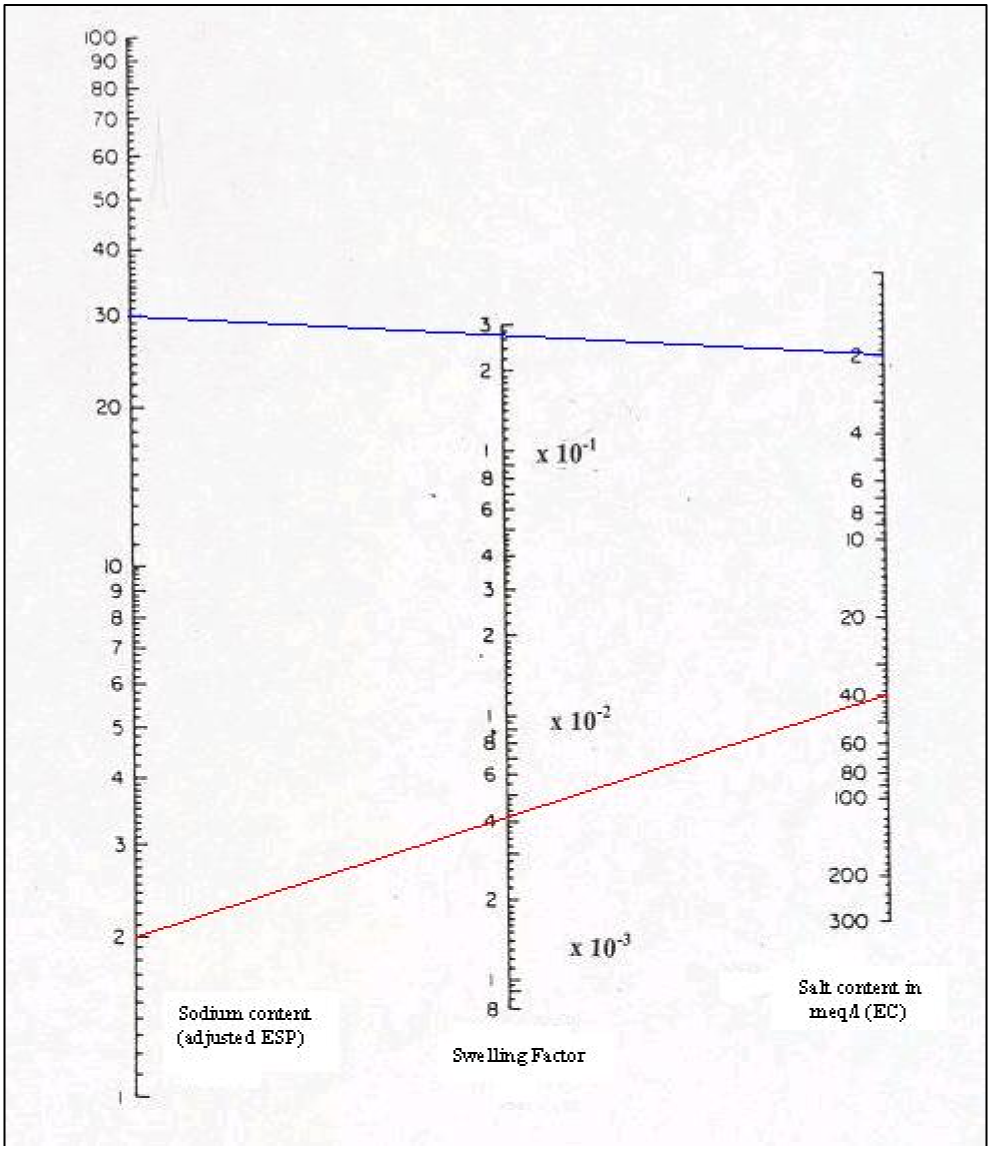

Figure 10. Swelling factor based on the Na content (adjusted ESP) of soil and EC_{SW} (McNeal, 1968).

2.6.2 Infiltration Rates Influenced by EC and SAR

The salinity (EC_W) and sodicity (SAR) interactions of irrigation water affect the soil surface water infiltration rate and permeability of the soil profile. Reduced infiltration rates from the dispersion of soil colloids can be caused by moderate to high SAR (Tanji et al., 2006). Clay dispersion is mainly dependent on the SAR; the higher SAR concentration of recycled water causes more clay dispersion than the lower SAR concentration of fresh water (Lado et al., 2005). To increase the soil surface infiltration rates, a relatively high EC_W is needed to coagulate the soil colloids when the SAR is high. Figure 11 shows the interaction of SAR and EC_W on the saturated hydraulic conductivity of Columbia silt loam. Irrigation water with low SAR and low EC_W infiltrates the soil slowly over a long time, while irrigation water with low SAR and medium to high EC_W infiltrates at an adequate rate. The hydraulic conductivity of the Columbia silt loam can increase by increasing EC_W for waters with a lower SAR, as shown in Figure 11 (Tanji et al., 2006).

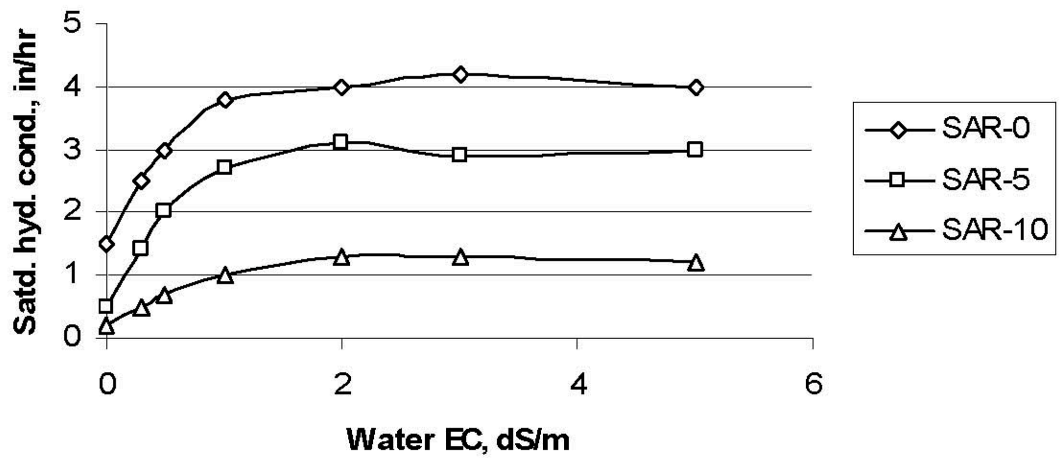

Figure 11. Soil hydraulic conductivity of Columbia silt loam dependent on the interactions of salinity and sodicity (Tanji et al., 2006).

The combined effects of water salinity and sodicity on water infiltration rates in medium- to fine-textured soils are evaluated in Figure 12 (Ayers and Westcot, 1985). The SAR is most detrimental to the soil permeability when the EC_W is low and this hazard can be partially overcome by increasing EC_W (Tanji et al., 2006). SAR can cause soil colloids (most notably clay minerals, such as smectite) to disperse causing a low water infiltration rate. EC coagulates soil colloids, which increases the water infiltration rate and can partially overcome a Na hazard (Tanji et al., 2006).

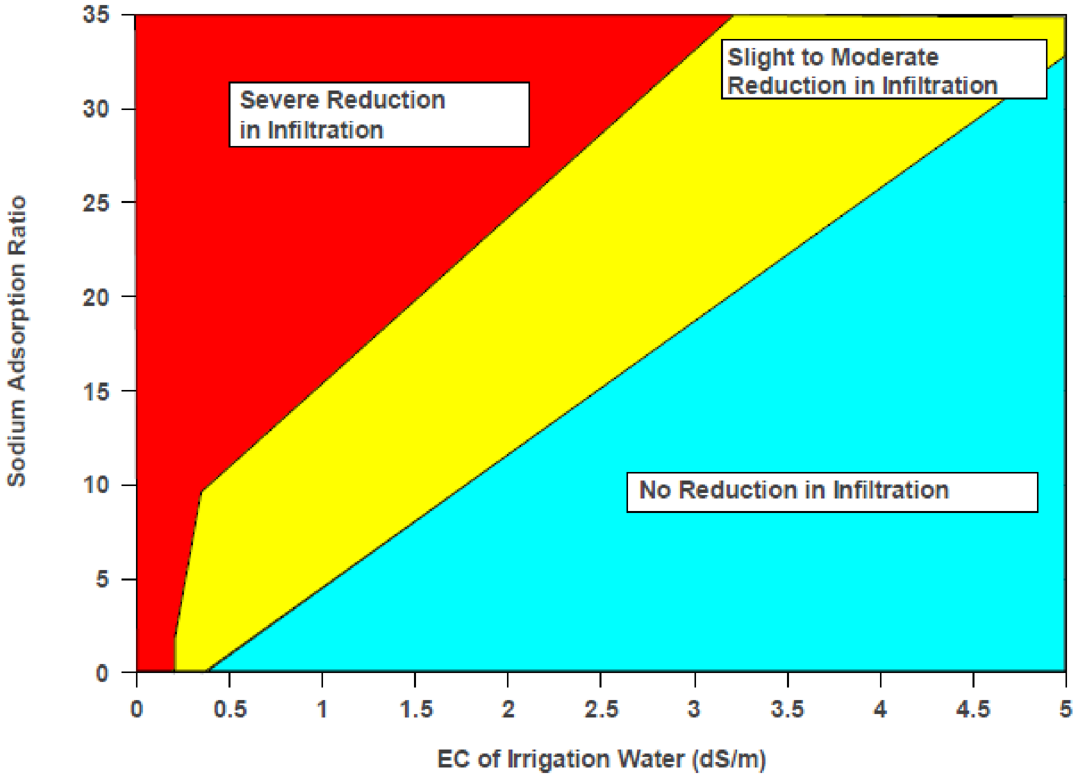

Figure 12. Diagram for evaluating the combined effects of SAR and EC of irrigation waters on soil permeability in medium to fine-textured soils (Ayers and Westcot, 1985).

Figure 13 shows the SAR-EC combinations of recycled water used for irrigation, as reported by some of California's major water recycling agencies (Tanji et al., 2006). Most of these recycled waters are within the zone of no reduction in infiltration rate, some recycled waters are in the zone of slight to moderate reduction in infiltration rate, and no recycled water is in the zone of severe reduction in infiltration rate.

Several of the water agencies add gypsum if the recycled water reduces the infiltration rate to the slight to moderate zone, so irrigating with recycled water does not cause infiltration problems. The Carmel Area Wastewater District plans to desalinate its recycled water to meet criteria for TDS concentrations, but desalinating can change the recycled water from the zone of no reduction to the zone of slight to moderate reduction in infiltration rate unless gypsum is continually added (Tanji et al., 2006).

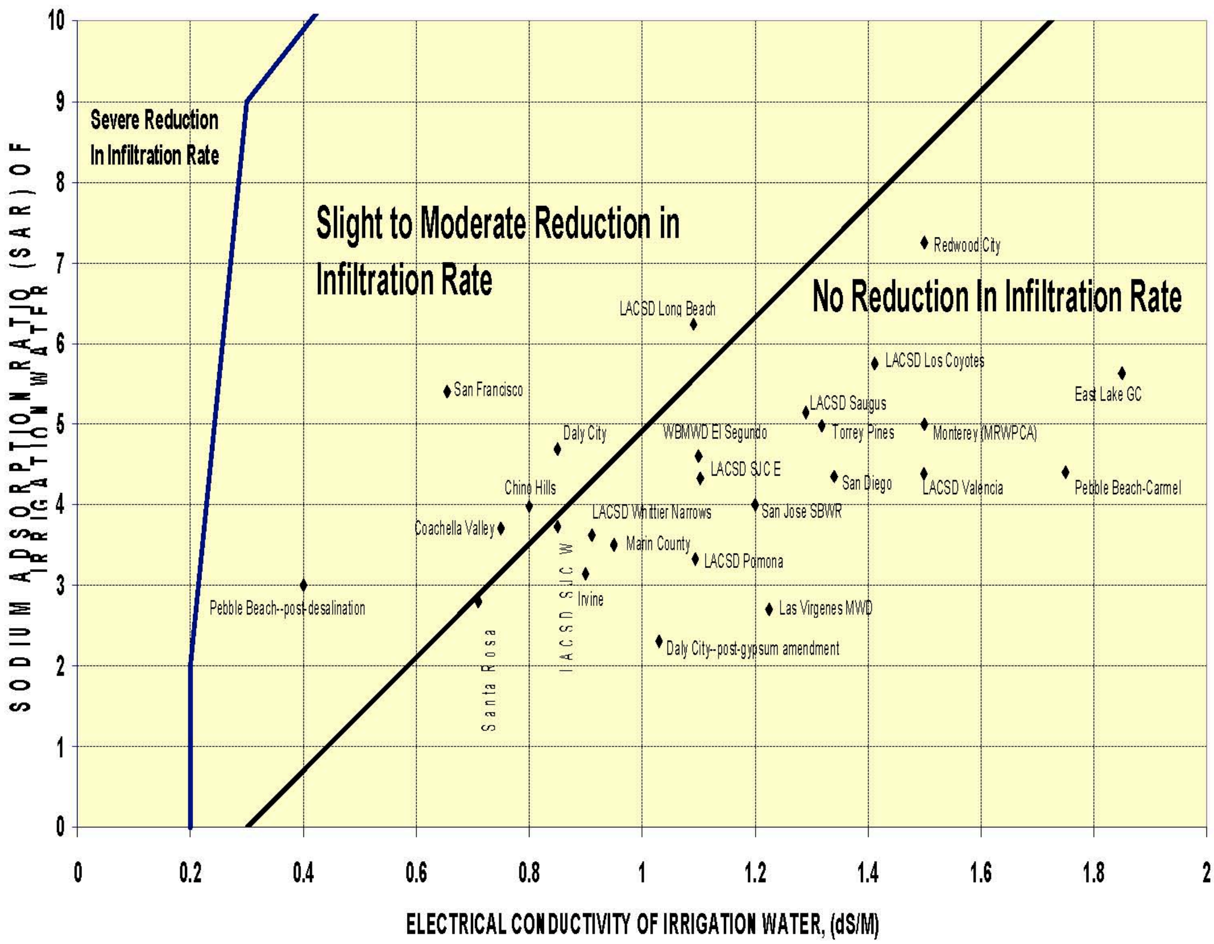

Figure 13. SAR-EC combinations of recycled water used for irrigation, as reported by some of California's major water recycling agencies (Tanji et al., 2006).

2.7 Calcareous Soils

Calcareous soils are more suitable for irrigation waters with a high Na^+ content. The exchange of adsorbed Na^+ with soluble Ca^{2+} on the clay surface creates a better physical condition allowing Na^+ and excess salts to be leached from the root zone (Lado et al., 2005).

A study in Israel investigated the long-term effects of recycled irrigation water on soil chemical properties and infiltration in a clay soil with a high $CaCO_3$ content under a laboratory rainfall simulation study. Composite soil samples were collected from the surface (0 to 10 inches) from two different sites in Israel that were irrigated with fresh water or recycled water for over 10 years. The simulated rainfall was applied to air-dried or pre-wetted clay and sandy soils.

Percolated water was collected at incremental time intervals from the soil during the rainfall simulation and measured to determine the infiltration rate. The EC and SAR were measured in collected cumulative leachate during the simulated rainfall (Lado et al., 2005).

Throughout the rainfall simulation, the sandy soil had significantly higher SAR values in the leachate of the recycled water irrigated soil compared to the fresh water irrigated soil, and the clay soil did not have significantly different SAR values in the leachate of the recycled water irrigated soil compared to the fresh water irrigated soil. The SAR in the leachate of the recycled water irrigated soil decreased during the simulated rainfall most likely due to the exchange of adsorbed Na^+ with soluble Ca^{2+}. The high $CaCO_3$ content of the clay soil may have maintained a high Ca^{2+} concentration during the pre-wetting and the simulated rainfall. Still, the recycled water irrigated samples had higher SAR values compared to the fresh water irrigated samples in both soils. The higher SAR values in the leachate of the recycled water irrigated sandy soil increased the amount of clay dispersion, which reduced infiltration (Lado et al., 2005).

The recycled water had a higher EC_W compared to the fresh water resulting in a higher EC_e of the recycled water irrigated soils. The EC_{SW} of the clay soil leachate was higher than the sandy soil because of the dissolution of $CaCO_3$ in the clay soil (Lado et al., 2005).

A study in Iran assessed the effects of recycled water irrigation on soil sodicity and nutrient leaching in calcareous soils. The leached soil solution was analyzed for soluble anions (Cl^- and SO_4^{2-}) and cations (Ca^{2+}, Mg^{2+}, Na^+, and K^+). Soils samples were analyzed for EC, pH, and exchangeable Na^+ (Jalali et al., 2008).

Na^+ exchanged with Ca^{2+}, Mg^{2+}, and K^+ in the soil solution after the application of recycled water. Soils having an existing high ESP were less affected by the high Na^+ concentration in the recycled water compared to the soils having an initially low Na^+

concentration. Mg^{2+} and K^{+} were leached from the soils under recycled water irrigation. The soil structure was not damaged; just a slight decrease in permeability was experienced (Jalali et al., 2008).

2.8 Soil Management Solutions

Soil management solutions for crusting and compaction problems can be addressed using chemical amendments at the soil's surface, adding organic matter and/or tillage, and changing the irrigation system. The addition of gypsum, acidification, soil conditioners, and organic matter have proven to be effective over many years of agricultural management using fresh water and groundwater and can be applied using recycled water (CPHA, 2004; Tanji et al., 2006).

Gypsum is a chemical amendment that is mostly Ca^{2+} or an acid-producing amendment yielding Ca^{2+} able to improve the soil and water quality used to irrigate. Gypsum is relatively inexpensive and can easily be applied as a soil and water amendment. The Ca^{2+} released from the dissociation of gypsum reduces the SAR of the irrigation water and soil, enhances the stable aggregation of soil, and increases the salt concentration in water. Gypsum is applied by spreading on the soil's surface at a rate of 1 to 4 tons per acre and then tilled into the soil or it is dissolved into a slurry mix and injected into irrigation water. Applying gypsum to the soil and irrigation water can increase the Ca^{2+} concentration by 2 to 4 meq/L (40 to 80 mg/L) (CPHA, 2004; Tanji et al., 2006).

Acid-forming amendments can be used to produce hydrogen ions that dissolve $CaCO_3$ in the soil releasing soluble Ca^{2+}. Examples of acid-forming amendments are sulfur, sulfur dioxide gas, lime sulfur, sulfuric acid, ammonium polysulfide, and ammonium thiosulfate. There is a table delineating the number of tons equivalent to pure gypsum or elemental sulfur (CPHA, 1998). There is a conversion table with the number of pounds required per acre-foot of water to obtain 1 meq Ca^{2+}/L or that required to replace 1 meq/100 g of exchangeable Na^{+} in the top 6 inches of soil per acre (Oster et al., 1984).

Soil conditioners composed of synthetic organic polymers bind small soil aggregates into larger ones. As an example, polyacrylamide (PAM) can increase the water infiltration rate when PAM is applied at a rate of 30 lbs. per acre in the irrigation water (Tanji et al., 2006).

Organic matter improves the water infiltration rate when added to the soil. Examples of organic matter are crop residues, cover crops, manure, and biosolids from municipal wastewater treatment. The polysaccharides in organic matter can bind soil particles that maintain soil structure and enhance aggregation (Tanji et al., 2006).

3.0 MATERIALS AND METHODS

3.1 Overview

The soil salinity levels were monitored in the same locations at three Test Sites irrigated with an approximate 2:1 blend of recycled and well water (Test Water), and at three Control Sites irrigated with only well water (Control Water) in Castroville, California. Irrigation water quality data was also collected at the Test and Control Sites. The irrigation water quality and soil salinity levels at each site were from samplings taken from 2000 to 2009.

The Regional Treatment Plant (RTP) pictured in Figure 14, includes the Salinas Valley Reclamation Plant (SVRP) which is the tertiary treatment process of the RTP. The recycled water from the SVRP meets the California Department of Public Health, Title 22 of the Code of

Figure 14. RTP for the Monterey Bay region (Courtesy of MRWPCA).

Regulations on Water Recycling Criteria (CDPH, 2009). Monterey Regional Water Pollution Control Agency (MRWPCA) owns and operates the SVRP, which provides approximately 20 million gallons of recycled water per day that can be used for irrigation. This rate does not meet the peak demand periods of the Monterey County Water Recycling Projects' (MCWRP) service area (farmlands receiving recycled water shown in Figure 15). The farmlands receiving recycled water are known as the Project Area. The source of the wastewater is sanitary sewage from local municipalities including Pacific Grove, Monterey, Del Rey Oaks, Seaside, Sand City, the former Fort Ord, Marina, Castroville, Moss Landing, Salinas, and unincorporated parts of north Monterey County.

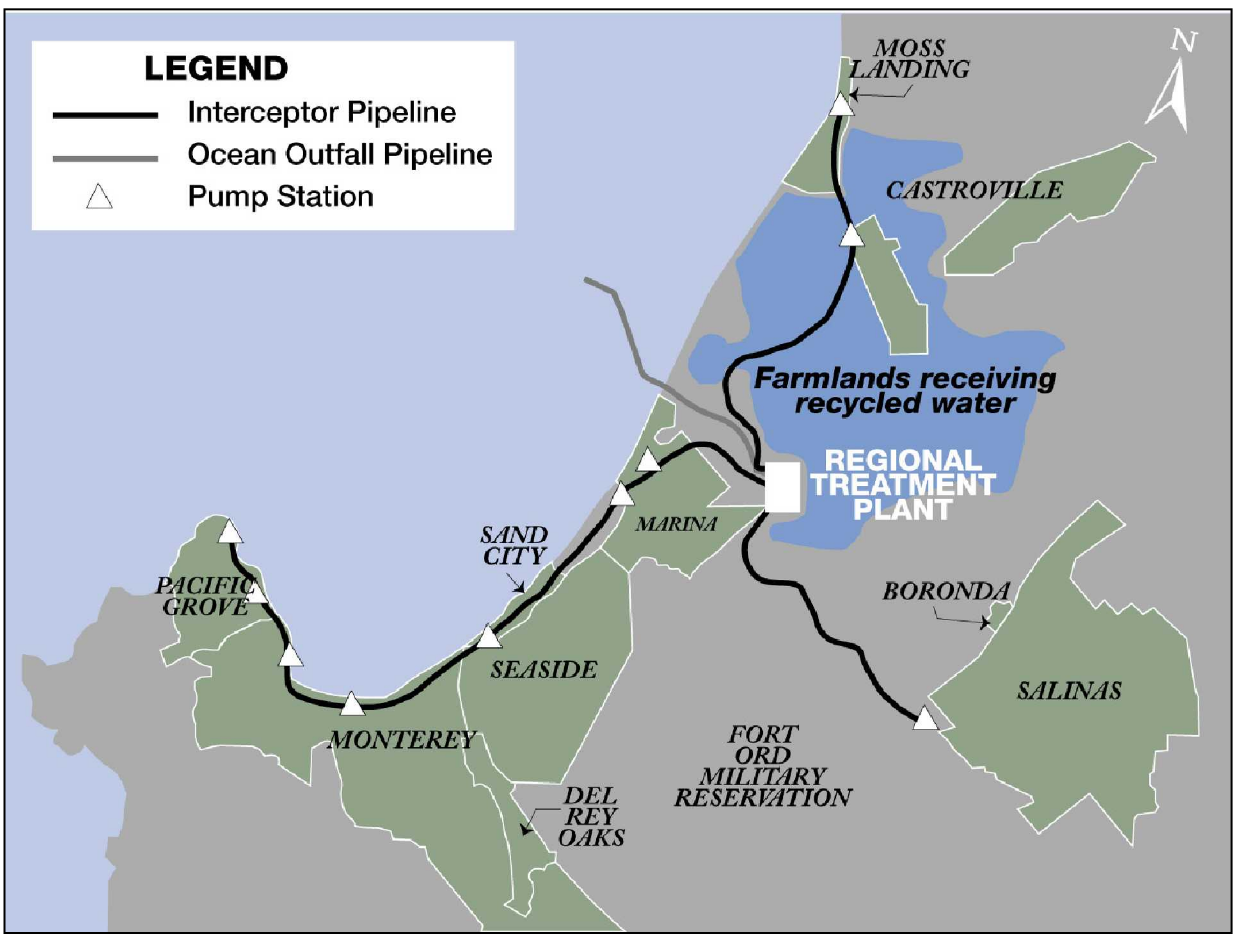

Figure 15. MCWRP service area and wastewater from local municipalities (Courtesy of MRWPCA).

Supplemental wells, using groundwater from the 400-foot deep aquifer (Figure 16), are blended with recycled water within the pressurized distribution system to augment the water supply as necessary. The growers are no longer using the 180-foot deep aquifer because it is degraded from seawater intrusion due to over-pumping of the wells near the coast. The growers were using the 400-foot deep aquifer prior to 1997 (B. Holden; personal communication, 2013).

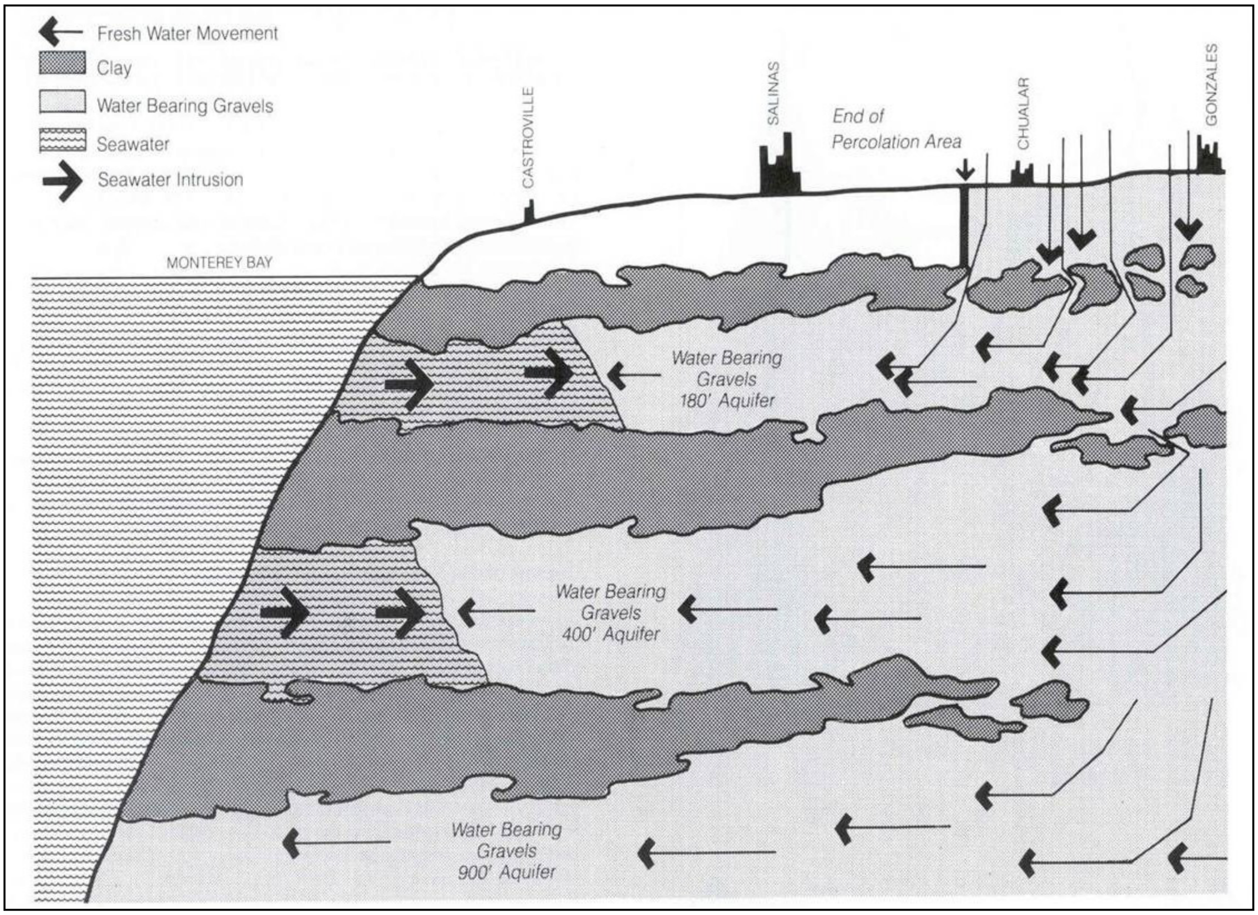

Figure 16. Groundwater movement in the northern Salinas Valley (Courtesy of MRWPCA).

3.2 Materials - Water

3.2.1 Supplemental Well Water

The average annual water quality values of the supplemental wells are in Table 3.

Table 3. Annual average supplemental well water quality values from 2000 to 2009.

		Year										Average
		2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	
Well Water	EC_w (dS/m)	0.63	0.57	0.62	0.60	0.77	0.59	0.58	0.60	0.66	0.63	0.63
	Ca^{2+} (meq/L)	2.34	2.07	2.06	2.50	3.13	2.09	1.97	2.18	2.15	2.45	2.29
	Mg^{2+} (meq/L)	1.30	1.16	1.19	1.38	1.88	1.13	0.96	1.21	1.00	1.07	1.23
	Na^{+} (meq/L)	2.37	2.14	2.43	2.63	3.03	2.29	2.57	2.63	2.70	2.61	2.54
	Cl^{-} (meq/L)	2.19	1.48	2.01	1.44	3.09	1.54	1.53	1.50	1.63	2.03	1.85
	SAR	1.79	1.72	1.89	1.89	2.13	1.82	2.17	2.06	2.19	2.02	1.97
	ESP (%)	1.36	1.26	1.50	1.50	1.85	1.40	1.90	1.75	1.93	1.69	1.62

3.2.2 Recycled and Blended Water

The recycled water average annual values and the blended water values (i.e., estimated test water) are in Table 4. The blended water values were calculated using the percent of recycled and well water used in a given year. A sample calculation is in Appendix B.3.

Table 4. Annual average recycled and blended water quality values from 2000 to 2009.

		Year										Average
		2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	
Recycled Water	EC_w (dS/m)	1.64	1.59	1.63	1.63	1.70	1.56	1.58	1.65	1.66	1.61	1.63
	Ca^{2+} (meq/L)	3.05	3.00	3.15	3.15	2.90	2.85	2.75	3.05	3.00	2.66	2.99
	Mg^{2+} (meq/L)	2.17	2.08	2.08	1.92	1.83	1.75	1.67	1.75	1.67	1.37	1.88
	Na^{+} (meq/L)	7.48	7.52	7.61	7.91	8.09	7.57	7.48	7.65	7.48	7.22	7.64
	Cl^{-} (meq/L)	7.29	7.06	7.63	7.54	8.09	6.69	7.17	7.29	7.51	7.20	7.36
	SAR	4.65	4.69	4.69	4.95	5.29	5.02	5.10	4.95	4.91	5.10	4.94
	ESP (%)	5.30	5.35	5.35	5.70	6.14	5.79	5.89	5.70	5.64	5.89	5.65
Blended Water	EC_w (dS/m)	1.23	1.25	1.29	1.29	1.36	1.23	1.23	1.25	1.31	1.20	1.26
	Ca^{2+} (meq/L)	2.77	2.68	2.78	2.94	2.98	2.59	2.48	2.72	2.70	2.57	2.72
	Mg^{2+} (meq/L)	1.82	1.77	1.78	1.74	1.85	1.54	1.42	1.54	1.43	1.24	1.61
	Na^{+} (meq/L)	5.43	5.71	5.87	6.17	6.24	5.77	5.78	5.74	5.80	5.28	5.78
	Cl^{-} (meq/L)	5.24	5.18	5.75	5.53	6.26	4.94	5.22	5.07	5.45	5.03	5.37
	SAR	3.50	3.69	3.75	3.94	4.13	3.93	4.09	3.85	3.95	3.81	3.86
	ESP (%)	3.76	4.01	4.10	4.35	4.62	4.34	4.55	4.23	4.37	4.17	4.25

The MRWPCA laboratory, an accredited laboratory run by Monterey County, analyzed the recycled water sampled at the SVRP to document salt concentrations in the recycled water introduced to the distribution system. The number of recycled water samples varied depending on the water usage year; more water samples were taken with increasing recycled water use. The greatest recycled water used was generally April through September when water was in higher demand during dry months with less rainfall.

The percent and amount in acre-feet (AF) of recycled and well water used system-wide for irrigation from 2000 to 2009 are shown in Table 5.

Table 5. Recycled and supplemental well water usage from 2000 to 2009.

	Year										Average
	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	
Recycled Water (AF)	9,833	12,276	13,054	13,177	13,409	11,224	11,475	13,359	15,228	11,814	12,485
Well Water (AF)	6,583	6,238	6,577	6,486	7,726	5,768	6,056	8,258	8,266	8,556	7,051
Total (AF)	16,416	18,514	19,631	19,663	21,135	16,992	17,531	21,617	23,494	20,370	19,536
% Recycled Water	59.9%	66.3%	66.5%	67.0%	63.4%	66.1%	65.5%	61.8%	64.8%	58.0%	63.9%
% Well Water	40.1%	33.7%	33.5%	33.0%	36.6%	33.9%	34.5%	38.2%	35.2%	42.0%	36.1%

The MRWPCA laboratory also analyzed the Control and Test Water for pH and Na^+ from each field sampling location (i.e., pressurized turnouts shown in Figure 17). Sampling the water within the distribution system verified the quality of water received by the growers after supplemental well water was blended with recycled water. The reported water quality data is in Appendix B.1 for the Control Sites and Appendix B.2 for the Test Sites. The annual average irrigation water quality pH and Na^+ values from 2000 to 2009 for each Test and Control Site are in Section 3.4. The Na^+ values (mg/L) were the only reported constituent at each Test and Control Site. A sample calculation converting the Na^+ value from mg/L to meq/L is in Appendix B.3.

Annual rainfall and reference evapotranspiration (ET_o) data were collected from the California Irrigation Management Information System (CIMIS) weather station #19 (Castroville), which is located within 3 miles of the Test and Control Sites. The CIMIS station #19 detail report is in Appendix D.1. The annual average rainfall for station #19 from January 2000 to December 2009 was 12.33 inches per year. The Monterey Bay Analytical Services, an accredited laboratory in Monterey, California, analyzed the rainfall water quality in October 2009. Rainwater was sampled at the RTP and near the Test and Control Site locations. Na^{+} was not detected in the rainwater samples as shown in Appendix D.2.

Figure 17. Pressurized turnout within the distribution system (Courtesy of MRWPCA).

3.3 Methods - Water

MRWPCA analyzed the water samples to detect salts and other constituents. The MRWPCA laboratory analyzed the water samples for pH by electrometric method (APHA et. al., 1999a), EC_w by conductivity, laboratory method (APHA et. al., 1999b), Na^{+}, Ca^{2+}, and Mg^{2+} by ion chromatography for cations in water and wastewater (ASTM, 2003), and Cl^{-} by ion chromatography for inorganic anions (U.S. EPA, 1993). The MRWPCA standard operating procedures for these methods are in Appendix A.1. These procedures are summarized below.

The Orion 3 Star Benchtop pH Meter (pH meter) was calibrated prior to use each day using the American Chemical Society (ACS) grade buffers with certified pH values of 4.00, 7.00, and 10.00. The calibration check was performed using a pH 7.40 Laboratory Control Standard (LCS). After calibrating the pH meter and checking the calibration, the pH was measured by immersing the probe into a stirred water sample. The pH results were recorded on a pH benchsheet (APHA et. al., 1999a).

The Orion 3 Star Benchtop EC Meter was calibrated prior to use each day using certified 1,413 uS/cm Orion Calibration Standard Solution. After calibrating the meter and performing the calibration check with a lab controlled standard (LCS) solution, the EC_w was measured by immersing the probe into a stirred water sample. The EC_w results were recorded on an EC_w benchsheet (APHA et. al., 1999b).

For measurement of cations by ion chromatography, six working standard solutions (4, 8, 12, 16, 24, and 30 mg/L) were prepared from the stock cation standards, which are 1,000 mg/L for Na^+, Ca^{2+}, and Mg^{2+}. Water samples were filtered prior to being diluted and the samples were prepared using a dilution factor of 10. For each sample batch, two Barnstead water blanks were tested at the beginning and calibration curves were run for the six working standard solutions, starting from the lowest concentration to the greatest concentration. A blank was included after the last calibration. A blank was used every 6 to 8 samples to ensure the instrument readings were stable. The ion chromatograph was operated with the helium pressure set at approximately 60 psi and an operating pump flow rate of 1 mL/min. The ion chromatograph was equilibrated with 20 mM MSA eluent prior to beginning each sample batch. The autosampler was turned on at the beginning of each sample batch and was allowed to run overnight (ASTM, 2003).

For measurement of anions by ion chromatography, six working standard solutions (4, 8, 12, 16, 20, and 24 mg/L) were prepared from the stock anion standard, which was 1,000 mg/L for Cl^-. Water samples were filtered prior to being diluted and the samples were prepared using a dilution factor of 10. For each sample batch, two Barnstead water blanks were tested at the beginning and calibration curves were run for the six working standard solutions, starting from the lowest concentration to the greatest concentration. A blank was included after the last calibration. A blank was used every 6 to 8 samples to ensure the instrument readings were stable. The ion chromatograph was operated with the helium pressure set at approximately 60 psi and an operating pump flow rate of 1 mL/min. The ion chromatograph was equilibrated with 9.0 mM Na_2CO_3 eluent prior to beginning each sample batch. The autosampler was turned on at the beginning of each sample batch and was allowed to run overnight (U.S. EPA, 1993).

The SAR and ESP were calculated using the equations below (Richards, 1954). Sample calculations are in Appendix B.3.

$$SAR = [Na^+]/\sqrt{([Ca^{2+}]+[Mg^{2+}])/2} \qquad [2.1]$$

$$ESP = 100*[(SAR*0.01475)-0.0126]/1+[(SAR*0.01475)-0.0126] \qquad [2.3]$$

3.3.1 Quality Control (QC) - Water

The MRWPCA standard operating procedures (Appendix A.1) for pH list the calibration check procedures using a lab controlled standard (LCS) solution to verify that the LCS value was within the acceptance range, which was ±3 standard deviations from the mean value of the most recent 30 LCS determinations. The mean LCS values were within the acceptance ranges and results from 2009 are in Appendix A.2.

The MRWPCA standard operating procedures (Appendix A.1) for EC_w list the calibration check procedures using a lab controlled standard (LCS) solution to verify that the LCS value was within 5% of the certified value. The LCS values were within 5% of the certified value and results from 2009 including sample calculations are in Appendix A.2.

The MRWPCA standard operating procedures (Appendix A.1) for cations by ion chromatography list the acceptable percent recovery ranges for the standard calibration check, spike blank, and recycled water matrix spike values. The percent recoveries of Na^+, Ca^{2+}, and Mg^{2+} for the standard calibration check values were acceptable because they were within range of 85 to 115%. The percent recoveries of Na^+, Ca^{2+}, and Mg^{2+} for the spike blank and recycled water matrix spike values were acceptable because they were within range of 90 to 110%. The percent recoveries of the instrument spikes ensure accuracy. The r-squared values were close to one for the calibration of the standards; there was a strong correlation between charge and the Na^+, Ca^{2+}, and Mg^{2+} concentrations. As an example, percent recoveries from September 2, 2009 are provided in Table 6. Water quality QC results from 2009 including sample calculations are in Appendix A.2.

Table 6. Instrument Quality Control: Na^+, Ca^{2+}, and Mg^{2+} and Cl^- concentrations for percent recovery of the standard calibration check, spike blank, and matrix spike, and the r-squared value.

	% Recovery			
	Calibration of Standard	Spike Blank	Matrix Spike	r^2
Ca^{2+}	98.9	96.2	104.8	99.96
Mg^{2+}	100.6	95.4	100.5	99.99
Na^+	100.1	98.2	104.7	99.98
Cl^-	94.2	92.1	110.0	99.98

The MRWPCA standard operating procedures (Appendix A.1) for anions by ion chromatography list the acceptable percent recovery ranges for the standard calibration check, spike blank, and recycled water matrix spike values. The percent recoveries of Cl^- for the standard calibration check, spike blank, and recycled water matrix spike values were acceptable because they were within range of 90 to 110%. The percent recoveries of the instrument spikes ensure accuracy. The r-squared values were close to one for the calibration of the standards; there was a strong correlation between charge and the Cl^- concentrations. As an example, percent recoveries from August 18, 2009 are provided in Table 6. Water quality QC results from 2009 including sample calculations are in Appendix A.2.

The MRWPCA standard operating procedures (Appendix A.1) for cations and anions by ion chromatography list the acceptable percent recovery ranges for the recycled water matrix spike duplicate values. The percent recoveries of Na^{+}, Ca^{2+}, Mg^{2+} and Cl^{-} for the recycled water matrix spike duplicate values were acceptable because they were within range of 90 to 110%; therefore, the percent recoveries of the methods ensure precision. As an example, percent recoveries from August 18, 2009 and September 2, 2009 for recycled water are provided in Table 7. Water quality QC results from 2009 including sample calculations are in Appendix A.2. The MDLs for Na^{+}, Ca^{2+}, and Mg^{2+} were 1 mg/L, and Cl^{-} was 2 mg/L (Table 7) (P. Parsons; personal communication, 2013).

Table 7. Method Quality Control: Na^{+}, Ca^{2+}, and Mg^{2+} and Cl^{-} concentrations for percent recovery of the precision of duplicates and method detection limit (MDL).

	% Recovery Duplicate	MDL (mg/L)
Ca^{2+}	103.6 to 105.3	1.0
Mg^{2+}	99.5 to 101.2	1.0
Na^{+}	103.1 to 105.5	1.0
Cl^{-}	107.6 to 109.7	2.0

3.4 Materials - Soil

Three Test Sites and three Control sites were selected to be monitored intensively to compare soil salinity levels in the northern Salinas Valley adjacent to Monterey Bay in Castroville, California (Figure 18). The Test Sites have been irrigated with Test Water since 1998, and the Control Sites have only used Control Water. Test Sites were selected based on soil characteristics and stratification, drainage system, type of crops grown, irrigation method, and farming practices. The Control Sites were chosen to be paired to the corresponding Test Sites to assure similarity (Platts et al., 2004).

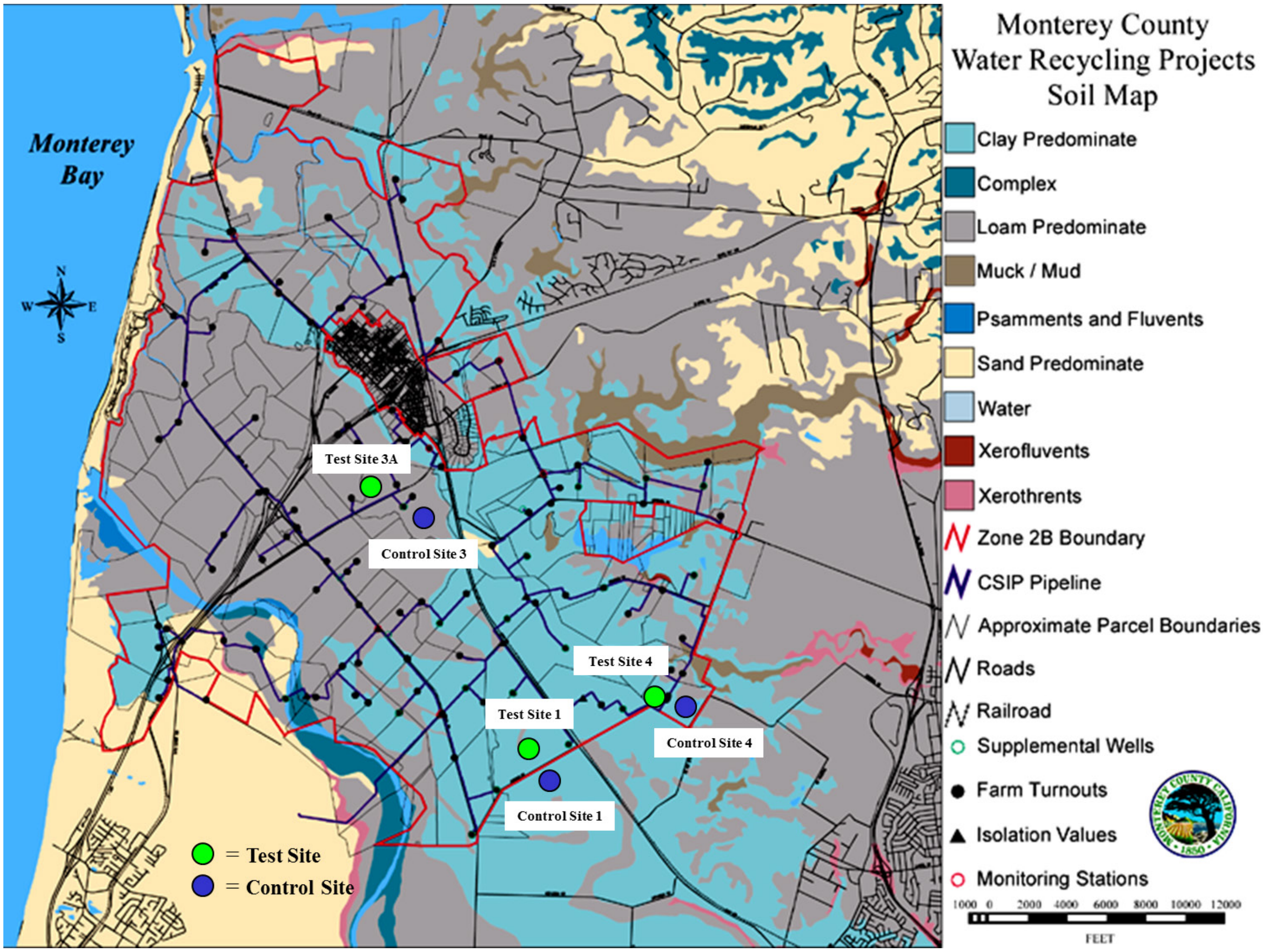

Figure 18. Soil sampling locations for the paired Test and Control sites in Castroville, California (Courtesy of MRWPCA).

An aquitard exists between the soil surface and the 180-foot deep aquifer (Figure 16) preventing percolation; tile drains were installed on all flat ground in the MCWRP service area. Control Sites 1 and 3 and Test Sites 1 and 3A have tile drains 48 inches below the soil surface (Table 8) (B. Platts; personal communication, 2013).

All of the soils in the Project Area are calcareous having an average cation exchange capacity (CEC) of 2,500 ppm with 65% Ca^{2+} in the CEC. The calcareous soils have free lime and elevated Ca^{2+} concentrations in the CEC; soils with free lime will have over 1,500 ppm Ca^{2+} (representing over 60% of the CEC). There was minimal variation of the CEC in the soils in the Project Area; therefore, CEC extractions were not performed. The ammonium acetate extraction method was used to determine the CEC values, which is the combined values of Ca^{2+}, Mg^{2+}, Na^{+}, and K^{+} (B. Platts; personal communication, 2013).

Table 8. Comparative summary of the Test and Control Sites.

Site ID	Soil Type	Topography	Tile Drain Present	Crops Grown	Average Annual Recycled Water Use	GPS Coordinates
Control 1	Clear Lake Clay	Flat	Yes	Vegetables/ Strawberries	-	36° 42' 34.8762" N, 121° 43' 29.6682" W
Test 1	Clear Lake Clay	Flat	Yes	Vegetables/ Strawberries	69%	36° 42' 39.4482" N, 121° 43' 35.4972" W
Control 3	Pacheco Clay Loam	Flat	Yes	Vegetables/ Strawberries	-	36° 44' 47.8392" N, 121° 44' 46.6146" W
Test 3A	Pacheco Clay Loam	Flat	Yes	Vegetables/ Strawberries	93%	36° 44' 53.8656" N, 121° 45' 16.5198" W
Control 4	Antioch Sandy Loam	Rolling	No	Artichokes	-	36° 42' 58.3734" N, 121° 41' 52.9044" W
Test 4	Antioch Sandy Loam	Rolling	No	Artichokes	58%	36° 43' 2.589" N, 121° 41' 58.416" W

Soil amendments, gypsum and lime, were routinely applied to the Test and Control Sites. Gypsum was applied to improve soil tilth and drainage. Lime was applied to increase the pH of the soil to prevent a common disease, Clubroot, of Brassica crops (e.g. broccoli, cauliflower, Brussels sprouts) in the Salinas Valley. The disease is caused by a fungus, *Plasmodiophora brassicae*, and is endemic to the soils of the Salinas Valley. The level of calcium in the calcareous soils in the Project Area was not enough to prevent Clubroot; therefore, lime was applied (B. Platts; personal communication, 2013). The University of California Integrated Pest Management (UC IPM) Program recommends liming for a soil with a pH below 7.2. A pH of 6.8 can cause spores to germinate and the fungal disease to reduce crop yields (UC IPM, 2013).

The growers in the MCWRP service area have similar fertility programs due to the similarity of soil types and crops grown. The typical fertility program for vegetable and strawberry fields applied 150 to 250 total lbs. of N/acre per crop depending on the grower and season. Strawberries have one crop per year and N fertilizer was applied from October to September. Vegetables have two crops per year and fertilizer was applied at a rate of 300 to 500 total lbs. of N/acre/year. The typical fertility program for artichoke fields applied 225 to 275 total lbs. of N/acre depending on the grower and season. Artichokes were harvested twice a year and the N fertilizer application was split between the two production periods (B. Platts; personal communication, 2010).

The crop yields were similar and there have been no significant changes in yields at the Test and Control Sites (B. Platts; personal communication, 2010).

3.4.1 Control and Test Site 1

Control Site 1 and Test Site 1 were identified as the Clear Lake clay with 0 to 2% slopes (NRCS, 2013a). The soil taxonomic classification of Control Site 1 and Test Site 1 is fine, smectitic thermic Xeric Endoaquerts. The soil series is Clear Lake and the soil order is a Vertisol (NRCS, 2013b).

Crops grown at Control Site 1 (Figure 19) and Test Site 1 (Figure 20) included lettuce, cauliflower, and strawberries. Irrigation methods included furrow, drip, and sprinkler irrigation, with sprinkler irrigation used the most. Control Site 1 received only well water. The annual average Test Water was comprised of approximately 69% recycled water (Table 9) and 31% well water for Test Site 1. The average irrigation water quality values of pH and Na^+ for Control Site 1 and Test Site 1 from 2000 to 2009 are in Table 10.

Figure 19. Broccoli irrigated with well water at Control Site 1 (Photo by author).

Figure 20. Strawberries irrigated with recycled water at Test Site 1 (Courtesy of MRWPCA).

Table 9. Test Site 1 recycled water usage from 2000 to 2009.

	Year										Average
	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	
% Recycled Water	73%	73%	74%	73%	78%	69%	60%	67%	56%	70%	69%

Table 10. Control Site 1 and Test Site 1 annual average irrigation water quality pH and Na^+ values from 2000 to 2009.

		Year									
		2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
pH	Control	-[1]	7.41 (0.09)	7.28 (0.08)	7.39 (0.13)	7.39 (0.10)	7.42 (0.12)	7.24 (0.20)	7.38 (0.09)	7.52 (0.22)	7.30 (0.12)
	Test	-[1]	7.56 (0.06)	7.38 (0.15)	7.47 (0.18)	7.51 (0.12)	7.51 (0.18)	7.39 (0.16)	7.52 (0.11)	7.55 (0.23)	7.53 (0.15)
Na^+ (meq/L)	Control	3.05 (-[2])	2.75 (0.24)	2.92 (0.29)	4.06 (0.76)	4.65 (0.60)	4.24 (0.63)	4.80 (0.70)	5.75 (1.07)	5.60 (0.48)	6.43 (0.82)
	Test	5.46 (-[2])	5.49 (2.10)	5.59 (1.87)	5.74 (2.37)	6.30 (2.03)	5.22 (1.64)	4.52 (1.15)	5.13 (2.67)	4.21 (1.35)	5.04 (2.08)

[1] pH values are not available for 2000.
[2] Na^+ raw data are not available for 2000. The average annual values for the Test and Control Sites were provided by MRWPCA.
Numbers in parentheses are standard deviations of the means. N=11 to 30 depending on the year.

3.4.2 Control Site 3 and Test Site 3A

Control Site 3 and Test Site 3A were identified as the Pacheco clay loam with 0 to 2% slopes (NRCS, 2013a). The soil taxonomic classification of Control Site 3 and Test Site 3A is fine-loamy, mixed, superactive, thermic Fluvaquentic Haploxerolls. The soil series is Pacheco and the soil order is a Mollisol (NRCS, 2013b).

Crops grown at Control Site 3 (Figure 21) and Test Site 3A (Figure 22) included lettuce, cabbage, cauliflower, broccoli, and strawberries. Irrigation methods included furrow, drip, and sprinkler irrigation, with sprinkler irrigation used the most. Control Site 3 received only well water. The annual average Test Water was comprised of approximately 93% recycled water (Table 11) and 6% well water for Test Site 3A. The average irrigation water quality values of pH and Na^+ for Control Site 3 and Test Site 3A from 2000 to 2009 are in Table 12.

Figure 21. Broccoli irrigated with well water at Control Site 3 (Photo by author).

Figure 22. Broccoli irrigated with recycled water at Test Site 3A (Courtesy of MRWPCA).

Table 11. Test Site 3A recycled water usage from 2000 to 2009.

	Year										Average
	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	
% Recycled Water	90%	89%	88%	100%	100%	91%	96%	94%	92%	94%	93%

Table 12. Control Site 3 and Test Site 3A annual average irrigation water quality pH and Na^+ values from 2000 to 2009.

		Year									
		2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
pH	Control	-[1]	7.34 (0.16)	7.25 (0.11)	7.40 (0.17)	7.54 (0.11)	7.51 (0.12)	7.41 (0.18)	7.54 (0.14)	7.60 (0.08)	7.51 (0.13)
	Test	-[1]	7.28 (0.13)	7.34 (0.10)	7.54 (0.13)	7.49 (0.13)	7.42 (0.12)	7.28 (0.21)	7.38 (0.10)	7.30 (0.15)	7.30 (0.19)
Na^+ (meq/L)	Control	3.46 (-[2])	3.13 (0.07)	3.14 (0.31)	3.60 (0.31)	3.51 (0.17)	3.33 (0.44)	3.50 (0.16)	3.74 (0.19)	3.44 (0.11)	3.22 (0.09)
	Test	6.66 (-[2])	6.70 (0.95)	6.67 (1.05)	7.98 (0.99)	8.14 (1.04)	6.88 (1.31)	7.16 (0.61)	7.20 (0.99)	6.95 (0.54)	6.78 (0.94)

[1]pH values are not available for 2000.
[2]Na^+ raw data are not available for 2000. The average annual values for the Test and Control Sites were provided by MRWPCA.
Numbers in parentheses are standard deviations of the means. N=7 to 31 depending on the year.

3.4.3 Control and Test Site 4

Control Site 4 and Test Site 4 were identified as the Antioch sandy loam with 2 to 9 percent slopes (NRCS, 2013a). The soil taxonomic classification of Control Site 4 and Test Site 4 is fine, smectitic, thermic Typic Natrixeralfs. The soil series is Antioch and the soil order is an Alfisol (NRCS, 2013b).

Artichokes were grown at Control Site 4 (Figure 23) and Test Site 4 (Figure 24) using sprinkler irrigation. Control Site 4 received only well water. The annual average Test Water was comprised of approximately 58% recycled water (Table 13) and 42% well water for Test Site 4. The average irrigation water quality values of pH and Na^+ for Control Site 4 and Test Site 4 from 2000 to 2009 are in Table 14.

Figure 23. Artichokes irrigated with well water at Control Site 4 (Photo by author).

Figure 24. Artichokes recently harvested at Test Site 4 (Photo by author).

Table 13. Test Site 4 recycled water usage from 2000 to 2009.

	Year										Average
	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	
% Recycled Water	59%	59%	37%	71%	58%	56%	64%	61%	46%	68%	58%

Table 14. Control Site 4 and Test Site 4 annual average irrigation water quality pH and Na^+ values from 2000 to 2009.

		Year									
		2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
pH	Control	-[1]	7.00 (0.26)	7.15 (0.21)	7.07 (0.23)	7.19 (0.22)	7.07 (0.06)	6.90 (0.14)	7.28 (0.24)	7.17 (0.12)	7.10 (0.15)
	Test	-[1]	7.32 (0.20)	7.37 (0.06)	7.56 (0.21)	7.63 (0.05)	7.57 (0.27)	7.50 (0.19)	7.51 (0.20)	7.51 (0.22)	7.38 (0.19)
Na^+ (meq/L)	Control	4.55 (-[2])	4.11 (0.09)	4.21 (0.13)	5.28 (0.19)	4.92 (0.25)	4.39 (0.28)	4.19 (0.25)	4.27 (0.35)	4.67 (0.17)	3.52 (0.10)
	Test	4.41 (-[2])	4.44 (2.21)	2.79 (1.03)	5.63 (2.70)	4.70 (1.51)	4.23 (2.08)	4.77 (1.71)	4.68 (2.46)	3.48 (1.61)	4.87 (2.33)

[1]pH values are not available for 2000.
[2]Na^+ raw data are not available for 2000. The average annual values for the Test and Control Sites were provided by MRWPCA.
Numbers in parentheses are standard deviations of the means. N=2 to 24 depending on the year.

3.5 Methods - Soil

Soil samples were collected three times per year at each site using the same Global Positioning System (GPS) coordinates (Table 8). By using the same location, the variability of salinity was reduced compared to sampling different areas of the site; therefore, the changes in soil salinity were related to the applied irrigation water quality. The soil was collected in the spring (before planting), mid-summer after harvest of the first crop, and late fall after the second crop harvest each year from 2000 to 2009. At each site, the soil was collected to assess the salinity level each year (Platts et al., 2004).

Soil samples were taken in a consistent manner. Deionized water was used to clean the soil sampling tools and the person sampling the soil used rubber gloves to avoid handling the core samples. Site data sheets were completed after each soil sampling three times a year and entered into a master file at MRWPCA.

Subsamples at each site were collected at three different soil depths and at four different locations within 40 inches of the designated GPS point (Table 8). The three soil depths were: 0 to 12 inches (top 1 inch of soil discarded), 12 to 24 inches, and 24 to 36 inches (Figure 25). At each site, the samples from the four locations were combined to make composite soil samples for each soil depth. The composite samples for each site included:

- 1 to 12 inch depth soil samples were combined from the four locations and placed in one sample bag.
- 12 to 24 inch depth soil samples were combined from the four locations and placed in one sample bag.
- 24 to 36 inch depth soil samples were combined from the four locations and placed in one sample bag.

After the composite samples were collected from the Test and Control Sites, they were packaged for shipment to Valley Tech Agricultural Laboratory, an accredited laboratory in Tulare, California.

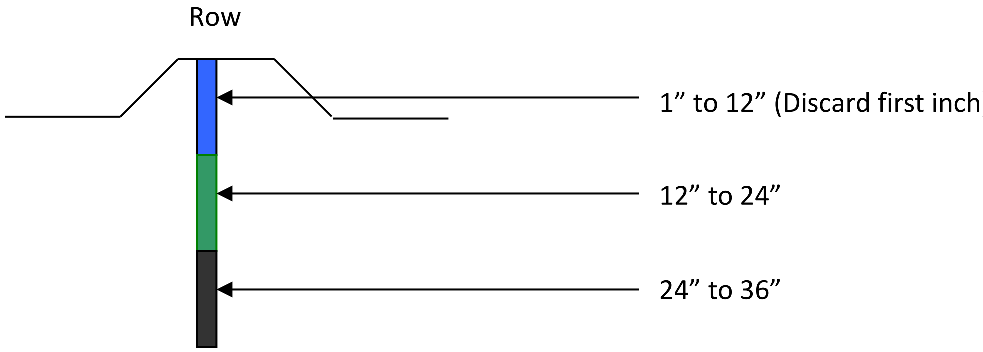

Figure 25. Sample soil profile with soil sampling information.

Valley Tech Agricultural Laboratory Services analyzed the soil samples from the saturated soil paste extract for pH, electrical conductivity (EC_e), extractable cations (Na^+, Ca^{2+}, and Mg^{2+}) and extractable anion (Cl^-). The soil analysis data sheets submitted to MRWPCA from Valley Tech Agricultural Laboratory Services are in Appendix C.1 for the Control Sites and Appendix C.2 for the Test Sites. The Valley Tech Agricultural Laboratory Services' standard operating procedures and QC results were not provided and were considered proprietary information. The Valley Tech Agricultural Laboratory Services' quality assurance program followed the guidelines for the Agricultural Lab Proficiency under the Collaborative Testing Services, Inc. and North American Proficiency Program under the Soil Science Society of America (S. Modesitt; personal communication, 2012). The methods used by Valley Tech Agricultural Laboratory Services are summarized below.

The saturated soil paste was prepared by weighing 200 to 400 grams of air-dry soil of known water content (assumed negligible) in a plastic container with its lid. The soil was then saturated with deionized water and mixed to obtain a uniform saturated soil paste until the paste glistened as it reflected light. After mixing, the soil paste was covered and allowed to stand at least 4 hours, preferably overnight, and then the saturation test was repeated. After saturation was attained, the saturated soil paste was reweighed in the plastic container with its lid. The difference between the final and initial weight of the plastic container, lid, and soil was the amount of water added to saturate the soil (Rhoades, 1982).

The saturated soil paste was transferred to a Buchner filter funnel fitted with highly retentive filter paper. Clear filtrate, 25 mL, was collected in a test tube or flask. One drop of 0.1% sodium hexametaphosphate [$(NaPO_3)_6$] solution was added to the extract to prevent the precipitation of $CaCO_3$ from the extract while it stood. The amount of $(NaPO_3)_6$ solution added increased the Na concentration 0.02 meq/L, which was inconsequential compared to the potential loss of $CaCO_3$. The soil pH, EC_e, Na^+, Ca^{2+}, Mg^{2+} and Cl^- was determined from the saturated paste extract (Rhoades, 1982).

The pH was determined by immersing a glass electrode from a pH meter into the saturated paste extract. The pH of the extract was recorded from the digital display (Richards, 1954).

The EC_e was determined by rinsing and filling the conductivity flow cell with standard potassium chloride (KCl) solution. A calibration check was performed by measuring the EC of the 0.01 *M* KCl standard solution (1.41 dS/m at 25°C) and adjusting the conductivity meter to read the standard conductivity. The conductivity flow cell was rinsed and filled with saturated paste extract. The EC_e of the extract was recorded from the digital display (Rhoades, 1982).

The concentration of Na^+, Ca^{2+}, and Mg^{2+} in the saturated paste extract was determined using Inductively Coupled Plasma Optical Emission Spectrometry (ICP-OES). Multi-element standard solutions were prepared using deionized water and 1*M* HCl for Na^+ and deionized water and 0.5 *M* HCl for Ca^{2+} and Mg^{2+}, which are 1,000 mg/L for each element. The calibration of the ICP spectrophotometer took into consideration the concentration range to be used, the inter-element interference correction, and the stability of standards. Secondary standards were used for each extracting solution and one for the total soil digest. Appropriate computer software was used to correct for inter-element interference. Operational parameters that have been used with the ICP spectrophotometer include: sample flow rate, 0.7 mL/min; Ar pressure, 5.624 kg/cm^2, aerosol carrier Ar flow rate, 1 L/min, Ar plasma support flow rate, 17 L/min; capillary used = tungsten carbide (o.d. = 0.99 mm, i.d. = 0.25 mm); height of observation above coil, 15 mm; incident power, 1.25 kW; reflected power, <3 W (Soltanpour, 1982).

The concentration of Cl^- in the saturated paste extract was determined using Flow Injection Analysis Colorimetry. The procedure is based on the release of the thiocyanate ion from mercuric thiocyanate through sequestration of mercury by the chloride ion to form un-ionized soluble mercuric chloride. The free thiocyanate ion reacts with the ferric ion to form highly colored ferric thiocyanate; the absorbance is proportional to the chloride concentration. The absorbance of the ferric thiocyanate was read using an interference filter wavelength at 480 nm (Diamond, 2001).

The concentrations of soluble Na^+, Ca^{2+}, and Mg^{2+} were used to determine the SAR of the soil. The SAR and ESP were calculated using the equations below (Richards, 1954). Sample calculations are in Appendix B.3.

$$SAR = [Na^+]/\sqrt{}([Ca^{2+}]+[Mg^{2+}])/2 \quad [2.1]$$

$$ESP = 100*[(SAR*0.01475)-0.0126]/1+[(SAR*0.01475)-0.0126] \quad [2.3]$$

3.6 Statistical Analysis

Descriptive statistics, including means and standard deviations were used to analyze irrigation water quality and soil salinity levels using Microsoft Office Excel 2010. Descriptive statistics were also computed using Minitab 16.1.1 to create boxplots and main effects plots of the different salts in the soil (Minitab, 2010). The statistical output data is in Appendix E.1 and E.2.

The mixed effects of treatment, location, depth, year, and their interactions were statistically analyzed using SAS 9.1.3 (SAS, 2006). The statistical significance was at the 0.05 level of probability ($p < 0.05$). The statistical output data is in Appendix E.1.

The z-value and p-value were used for the statistical analyses of location. The z-value is a test of statistical significance that leads to the p-value; the z-value is the ratio of the estimate to the standard error of the estimate. The p-value is the probability that the null hypothesis was falsely rejected. Both parameters were associated with the standard normal distribution, which relates standard deviations with probabilities and determines significance and confidence associated with z-values and p-values.

The F-value and p-value were used for depth, year, and treatment. The F-value is the ratio mean squares between samples to the mean square error within samples. The p-value was used to determine whether a factor was significant.

The Tukey-Kramer method was used to assess which years differ from one another for soil Na^{+} levels using SAS 9.1.3 (SAS, 2006). The Tukey-Kramer method is a multiple comparison procedure and statistical test used in conjunction with ANOVA. The statistical output data is in Appendix E.1.

4.0 RESULTS AND DISCUSSION

4.1 Test and Control Sites Overview

The annual average percentage of recycled water used system-wide from 2000 to 2009 is summarized in Table 5, which ranged between a low of 59.9% in 2000, to a high of 67.0% in 2003. The SAR and EC_w values of the estimated Test Water and Control Water delivered to each location are summarized below in Table 15. The SAR and EC_w of the estimated Test Water were higher than the Control Water throughout the study. The average amount of Na^+ in the recycled water was 176 mg/L, which was equivalent to applying 217 kg of Na^+ per AF of water. The average amount of Na^+ in the well water was 58 mg/L, which was equivalent to applying 72 kg of Na^+ per AF of water.

Table 15. Estimated SAR and ECw of irrigation water applied to Control and Test Sites.

Year	SAR		EC_w (dS/m)	
	Control	Test	Control	Test
2000	1.79	3.50	0.63	1.23
2001	1.72	3.69	0.57	1.25
2002	1.89	3.75	0.62	1.29
2003	1.89	3.94	0.60	1.29
2004	2.13	4.13	0.77	1.36
2005	1.82	3.93	0.59	1.23
2006	2.17	4.09	0.58	1.23
2007	2.06	3.85	0.60	1.25
2008	2.19	3.95	0.66	1.31
2009	2.02	3.81	0.63	1.20
Average	1.97	3.86	0.63	1.26

Most recycled waters produced in California have SAR and EC_w combinations that are in the safe range regarding the impacts on soil permeability (Parsons et al., 2010). The SAR and EC_w combinations of the Control and Test Water were suitable for irrigation with no anticipated reduction in infiltration (Ayers and Westcot, 1985). The combined average SAR of the recycled water at 4.9 with an EC_w of 1.6 dS/m (Table 4), were safe for long-term irrigation according to agronomic standards (Hanson et al., 1999).

The average annual soil salinity levels from all depths from the Control and Test Sites during the study (2000 to 2009) are summarized in Table 16. According to the classification of salt-affected soils, the Control and Test Sites were classified as normal with an average pH below 8.5, EC_e below 4.0 dS/m, SAR below 13, and ESP below 15% (Richards, 1954). At the Control Sites, the combined average pH was 6.99, EC_e was 2.29 dS/m, SAR was 2.05, and ESP was 1.73%. At the Test Sites, the combined average pH was 7.19, EC_e was 2.90 dS/m, SAR was 3.23, and ESP was 3.37%.

Table 16. Control and Test Sites average annual pH, EC_e, SAR, and ESP levels during the study.

		Year									
		2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
pH	Control	6.88 (0.87)	6.76 (0.85)	6.85 (0.69)	6.94 (0.76)	6.97 (0.61)	7.10 (0.60)	7.04 (0.75)	7.14 (0.58)	7.02 (0.62)	7.23 (0.39)
	Test	7.13 (0.63)	7.09 (0.44)	7.07 (0.53)	7.23 (0.52)	7.14 (0.50)	7.25 (0.46)	7.25 (0.50)	7.28 (0.48)	7.23 (0.46)	7.24 (0.41)
EC_e (dS/m)	Control	1.36 (0.86)	1.66 (1.04)	2.45 (1.21)	2.66 (0.96)	2.17 (1.18)	2.01 (0.80)	2.24 (0.96)	2.70 (1.12)	3.20 (1.42)	2.56 (1.63)
	Test	2.11 (1.18)	2.76 (1.42)	3.19 (1.63)	4.45 (2.10)	2.59 (1.14)	2.60 (1.27)	2.56 (1.02)	2.94 (1.43)	3.27 (1.78)	2.47 (1.31)
SAR	Control	2.19 (0.98)	1.75 (0.60)	1.93 (0.74)	1.97 (0.74)	2.00 (0.62)	2.11 (0.67)	2.19 (0.62)	1.95 (0.45)	2.15 (0.62)	2.21 (0.44)
	Test	3.03 (1.40)	2.69 (0.85)	2.68 (0.71)	3.24 (0.95)	3.09 (0.61)	3.11 (0.86)	4.03 (1.28)	3.21 (0.80)	3.64 (0.70)	3.85 (0.80)
ESP (%)	Control	1.91 (1.37)	1.30 (0.86)	1.55 (1.04)	1.61 (1.04)	1.65 (0.89)	1.81 (0.95)	1.92 (0.88)	1.58 (0.64)	1.87 (0.87)	1.95 (0.63)
	Test	3.08 (1.89)	2.62 (1.18)	2.61 (1.00)	3.38 (1.29)	3.19 (0.84)	3.20 (1.19)	4.44 (1.68)	3.35 (1.09)	3.94 (0.95)	4.22 (1.07)

Numbers in parentheses are standard deviations of the means. N=27.

The Control and Test Sites were selected based on soil characteristics and stratification, drainage system, type of crops grown, irrigation method, and farming practices. The Control Sites were chosen to be paired to the corresponding Test Sites to assure similarity (Platts et al., 2004). Location 1 included Control Site 1 and Test Site 1. Location 3/3A included Control Site 3 and Test Site 3A. Location 4 included Control Site 4 and Test Site 4. Each Control and Test Site within a location had similar soil characteristics and stratification, drainage system, type of crops grown, irrigation method, and farming practices, which is described in Section 3.4.

4.2 Statistical Analysis of Soil Salinity

The variability of soil salinity levels were assessed by location, depth, year, and treatment. The p-values for SAR, ESP, EC_e, and Na^+ are shown by location, depth, year, and treatment in Tables 17, 18, 19, and 20, respectively.

There was no significant variation or difference in SAR, ESP, EC_e, and Na^+ levels between locations (Table 17) and depths (Table 18), which was not anticipated. There was a large amount of variation in the soil salinity data making it difficult to assess significant differences by location and depth using the statistical model. Appendix F contains graphed soil salinity data during the study for the depths (i.e., 1 to 12 inches, 12 to 24 inches, and 24 to 36 inches) at the Control and Test Sites for locations 1, 3/3A, and 4. The variation in soil salinity data was large between years at the same site and same depth, which was expected if salts were moving down the soil profile and rainfall varied (Table 21). If the variability within a location was larger than the variability between locations, then statistical differences between locations will not be significant (Table 17).

Table 17. Average soil salinity levels at different locations from all depths during the study (2000 to 2009).

Location	N	SAR	ESP (%)	EC_e (dS/m)	Na^+ (meq/L)
1	177	2.37 (1.11)	2.15 (1.56)	3.38 (1.53)	8.72 (5.35)
3/3A	174	2.98 (1.02)	3.02 (1.39)	2.12 (1.25)	7.48 (3.76)
4	174	2.56 (0.86)	2.44 (1.17)	2.24 (1.18)	6.64 (2.46)
P>Z value		0.3322	0.3318	0.3239	0.3437

Numbers in parentheses are standard deviations of the means.
N is the number of soil samples collected during the study.

The locations were diverse pertaining to soil type, drainage, and slope. Location 1 had a Clear Lake clay that was classified as smectitic (NRCS, 2013a), which can retain salts more effectively compared to the Pacheco clay loam at location 3/3A and the Antioch sandy loam at location 4. The soil's particles have a tendency to swell, separate, and disperse if the soil contains mostly smectite clays (Brady and Weil, 2004). Location 3/3A had better drainage than location 1 during the study (B. Platts; personal communication, 2013). Location 4 was on steep slopes compared to locations 1 and 3/3A's flat ground that contained tile drains. Tile drains enhance leaching and the removal of salts, which can improve soil productivity. Reduced drainage is more likely to occur in fine-textured (silt or clay) soils compared to coarse-textured (sandy) soils (Cihacek et al., 2012; Parkinson and Reid, 1986). Location 4 did not have tile drains because of its adequate soil permeability and steep slopes compared to locations 1 and 3/3A.

Table 18 summarizes the soil salinity at different depths from all locations. There was no significant difference in SAR, ESP, EC_e, and Na^+ levels between depths, which was not expected because the variation in the salinity data was large between years at the same site and same depth indicating salts were moving down the soil profile as mentioned above. Typically, the soil depths near the surface become the zone of salt leaching and the lower soil depths become the zone of salt accumulation when water is applied uniformly across the irrigated land (Ayers and Westcot, 1985; Tanji et al., 2006).

Table 18. Average soil salinity levels at different depths from all locations during the study (2000 to 2009).

Depth (inches)	N	SAR	ESP (%)	EC_e (dS/m)	Na^+ (meq/L)
1-12	175	2.50 (0.93)	2.35 (1.30)	2.67 (1.57)	7.29 (3.68)
12-24	175	2.62 (0.95)	2.51 (1.32)	2.69 (1.55)	7.90 (4.64)
24-36	175	2.79 (1.18)	2.74 (1.62)	2.41 (1.17)	7.67 (4.01)
P>F value		0.0568	0.0619	0.1348	0.3169

Numbers in parentheses are standard deviations of the means.
N is the number of soil samples collected during the study.

Table 19 summarizes the soil salinity between years at all sites. There was a significant difference in SAR, ESP, EC_e, and Na^+ levels between years. The significant difference in soil salinity levels between years was expected considering salts accumulate over time in direct proportion to the rate they are applied with irrigation water (Poole et al., 2004). The amount of irrigation water applied system-wide increased from 2000 to 2004 and from 2005 to 2008 as shown in Table 5. The Na^+ levels were significantly different between 2000 and 2003 and between 2005 and 2008. The Na^+ content was the primary constituent of concern as discussed in the following sections. There was a significant difference in Na^+ levels between 2000 and the years 2006, 2007, 2008, and 2009. The higher Na^+ levels in the later years of the study were expected. Salts tend to accumulate on the root zone of actively transpiring plants because more or less pure water is lost to evaporation and transpiration, whereas dissolved mineral salts in the applied water remain in the soil solution (Parsons et al., 2010). Also, fine-textured soils, such as clay and clay loam, have smaller particle sizes and pore spaces with more surface area compared to coarse-textured soils (sandy); therefore, clay soils have high water retention, slow drainage, and retain salts more effectively than sandy soils. The management of clay and clay loam soils in the MCWRP service area has been an ongoing challenge for the growers due to their ability to accumulate salts. The amount of rainfall varied between years (Table 21), which may affect the accumulation of salts regardless of treatment (Platts et al., 2004).

Table 19. Average soil salinity levels in different years from all depths and locations during the study.

Year	N	SAR	ESP (%)	EC_e (dS/m)	Na^+ (meq/L)
2000	54	2.57 (1.26)	2.45 (1.72)	1.68 (1.05)	5.61 (3.28)
2001	54	2.22 (0.87)	1.96 (1.22)	2.21 (1.35)	5.91 (3.21)
2002	54	2.30 (0.81)	2.08 (1.14)	2.82 (1.47)	6.88 (3.20)
2003	54	2.60 (1.04)	2.49 (1.46)	3.56 (1.85)	8.96 (5.30)
2004	54	2.59 (0.79)	2.48 (1.11)	2.33 (1.18)	7.45 (3.54)
2005	48	2.55 (0.90)	2.42 (1.26)	2.27 (1.06)	7.03 (3.45)
2006	48	2.99 (1.33)	3.02 (1.80)	2.38 (0.99)	7.92 (3.59)
2007	54	2.58 (0.90)	2.46 (1.26)	2.82 (1.28)	8.27 (3.95)
2008	54	2.90 (1.00)	2.91 (1.38)	3.24 (1.60)	9.60 (5.02)
2009	51	3.08 (1.05)	3.16 (1.44)	2.52 (1.45)	8.60 (4.41)
P>F value		0.0002	0.0002	<0.0001	<0.0001

Numbers in parentheses are standard deviations of the means.
N is the number of soil samples collected during the study.

Table 20 shows the comparison of the soil salinity values for the Control and Test Sites for all locations. There was a significant difference in SAR, ESP, EC_e, and Na^+ levels between the Test and Control Sites. The higher soil salinity at the Test Sites was expected considering the higher Na^+ content of the recycled water compared to the Control Sites that received only supplemental well water.

Table 20. Average soil salinity levels in the Test and Control Sites for all depths and locations during the study (2000 to 2009).

Treatment	N	SAR	ESP (%)	EC_e (dS/m)	Na^+ (meq/L)
Control	267	2.05 (0.66)	1.73 (0.95)	2.29 (1.23)	5.58 (2.30)
Test	258	3.23 (1.00)	3.37 (1.36)	2.90 (1.58)	9.73 (4.53)
P>F value		0.0030	0.0029	0.0266	0.0047

Numbers in parentheses are standard deviations of the means.
N is the number of soil samples collected during the study.

4.3 Na^+ in the Test and Control Water

Figure 26 shows the comparison of values for the Control and Test Water for all locations. There was a significant difference in Na^+ levels between the Test and Control Water. The higher Na^+ content in the Test Water was expected considering the Na^+ content of the recycled water compared to the Control Water that contained only supplemental well water. Salts in recycled water can come from NaCl water softeners or saline groundwater that infiltrated into submerged pipelines carrying wastewater to the treatment facility. Recycled water may contain elevated levels of Na^+ and Cl^- in communities that use NaCl water softeners compared with the potable water supply (Parsons et al., 2010). For the MCWRP, Na^+ in the recycled water was likely from NaCl water softeners used in the Monterey Bay region (MRWPCA, 2013b). There was a small variation of the Na^+ in the applied Test Water during the study with the Test Water trend line having an r^2 value close to zero. Municipalities in California that provide recycled water for crop irrigation have encouraged the use of KCl instead of NaCl in residential and commercial water softeners to reduce Na^+ and increase K^+, a plant nutrient (Parsons et al., 2010). MRWPCA encourages the use of KCl water softeners, which may indicate the negative slope of Na^+ in the applied Test Water.

There were indications of seawater intrusion into the supplemental groundwater wells during the study, which was indicated by the positive linear relationship of the average Na^+ content trend line for the Control Water in Figure 26. The northern Salinas Valley has a history of seawater intrusion due to excessive groundwater withdrawal for agriculture. Monterey Bay has an approximate salinity of 33.5 Practical Salinity Unit (PSU) or parts per thousand (ppt), which is a 3.35% salinity composition by mass. The salinity in seawater is mostly comprised of Na^+ and Cl^- (DOE, 1994).

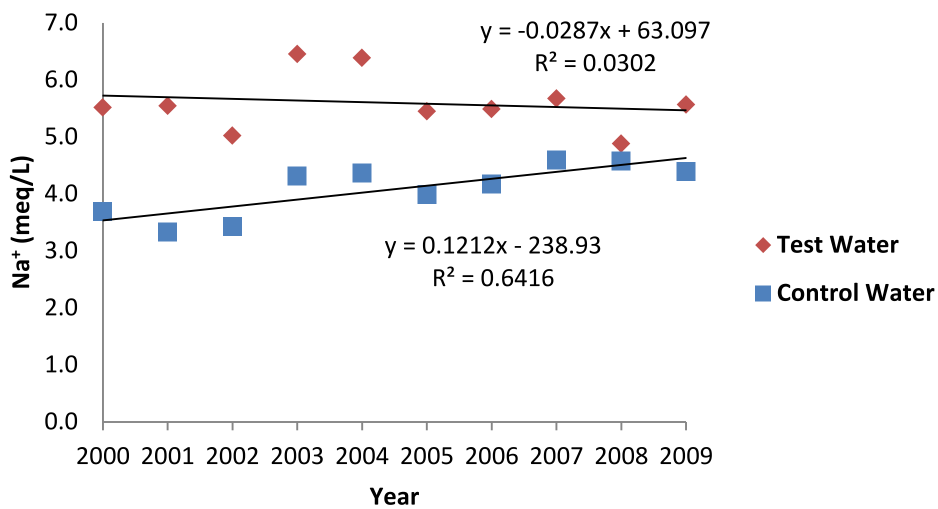

Figure 26. Average annual Na^+ values of the Test and Control irrigation water at in different years with trend lines.

4.4 Test and Control Sites Analysis of Na^+

The average soil Na^+ values at the Control and Test Sites increased during the study; the Control Sites increased from 4.29 ± 2.29 to 6.39 ± 2.35 meq/L and the Test Sites increased from 7.28 ± 3.59 to 10.56 ± 4.91 meq/L from 2000 to 2009 (Figure 27). The trend lines of the Test and Control Sites had a positive linear relationship. The average soil Na^+ values between the Test and Control Sites were highly correlated with a correlation coefficient of 0.88. The increasing soil Na^+ levels during the study were expected considering salts accumulate over time in direct proportion to the rate they are applied with irrigation water (Poole et al., 2004); the amount of irrigation water applied system-wide increased from 2000 to 2004 and from 2005 to 2008. For the Test Sites, the highest annual average soil Na^+ level was in 2003, which was also the year with the greatest amount of recycled water used system-wide.

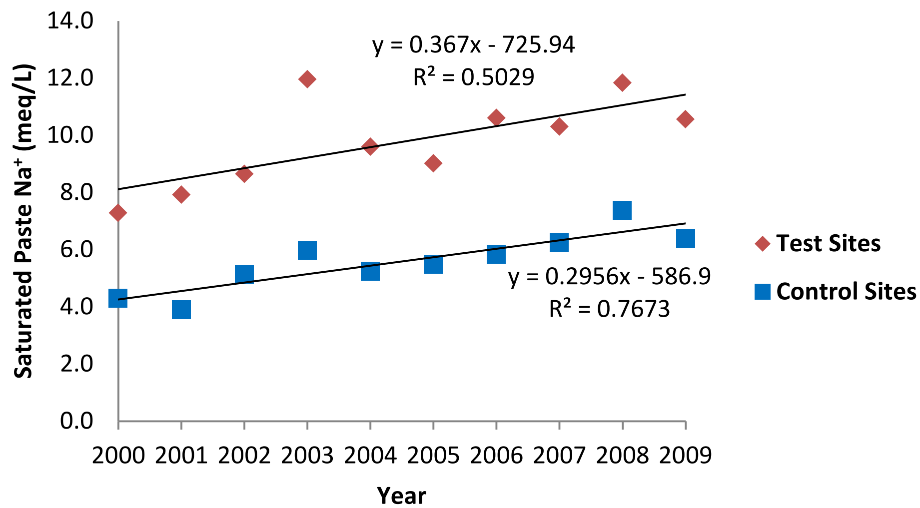

Figure 27. Average soil saturated paste Na^+ values for Test and Control Sites in different years with trend lines.

4.5 Comparison of Na^+ in Water and Soil

Fewer salts accumulate in the root zone when the amount of rainfall infiltrating the soil is close to meeting the plant's evapotranspiration requirements because rainwater has a low salt content. Most of the salts in the irrigation water accumulated in the root zone because the water was lost to evapotranspiration (Tanji et al., 2006). Table 21 summarizes the average Na^+ levels at the Test Sites and Test Water from all locations, annual rainfall, and annual reference evapotranspiration during the study. The lower soil Na^+ levels at the Test Sites in 2000 and 2005 may correlate with the larger amount of rainfall in those years. This leaching effect can be seen in Figure 27. In 2003, the highest average soil Na^+ level can be correlated with a greater amount of recycled water used along with the highest evapotranspiration during the study.

Table 21. Average Na^+ levels at the Test Sites and Test Water from all locations, annual rainfall, and annual reference evapotranspiration during the study (2000 to 2009).

Year	Test Soil SAR	Test Soil Na^+ (meq/L)	Test Water Na^+ (meq/L)	Rainfall[1] (inches)	Evapotranspiration[1] (inches)
2000	3.03	7.28	5.51	16.59	36.80
2001	2.69	7.92	5.54	14.33	36.26
2002	2.68	8.64	5.02	9.83	37.89
2003	3.24	11.95	6.45	13.48	40.04
2004	3.09	9.59	6.38	11.24	38.03
2005	3.11	9.01	5.44	17.78	36.24
2006	4.03	10.60	5.48	9.43	35.98
2007	3.21	10.30	5.67	10.18	36.75
2008	3.64	11.83	4.88	5.74	39.02
2009	3.85	10.56	5.56	14.71	38.42

[1]Annual rainfall and reference evapotranspiration data were collected from the CIMIS weather station #19 (Castroville, California).

The trend line of the soil Na^+ levels at the Test Sites had a positive linear relationship and the Na^+ content of the Test Water trend line had an r^2 value and slope close to zero in Figure 28. The Na^+ levels in the soil increased at the Test Sites even though there was a small variation in the applied Test Water during the study indicating that Na^+ accumulated over time. Excess salinity levels in the root zone can be avoided if an adequate amount of rainfall, irrigation, or both exceed the water holding capacity in the root zone and if soil water containing salts drains below the root zone (Tanji et al., 2006). Tile drains were used at locations 1 and 3/3A to improve drainage, but average Na^+ values at the Test Sites increased during the study. Salts tend to accumulate on the root zone of actively transpiring plants because more or less pure water was lost to evaporation and transpiration, whereas dissolved mineral salts in the applied water remain in the soil solution (Parsons et al., 2010).

The trend lines of the soil Na^+ levels at the Control Sites and the Na^+ content of the Control Water had a positive linear relationship. The average Na^+ values between the Control Sites and Control Water were highly correlated with a correlation coefficient of 0.85. Figure 29 shows the Na^+ levels in the soil increased at the Control Sites with increasing Na^+ levels in the

Control Water; salts accumulated over time in direct proportion to the rate they were applied with irrigation water (Poole et al., 2004).

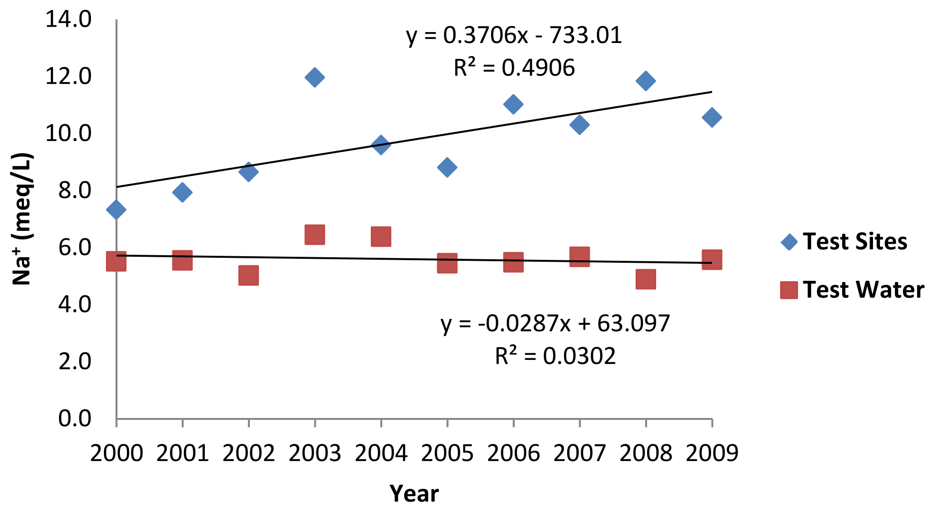

Figure 28. Average Na^+ values for Test Sites and Test Water in different years with trend lines.

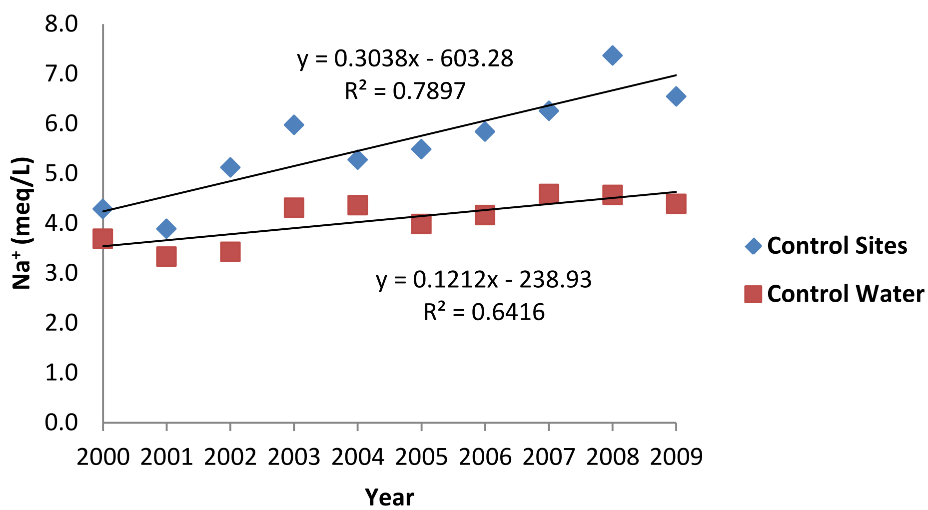

Figure 29. Average Na^+ values for Control Sites and Control Water in different years with trend lines.

4.6 SAR and EC_e of the Test and Control Sites

The Ca^{2+} and Mg^{2+} levels determined the SAR since SAR was the proportion of soluble Na^+ ions relative to soluble Ca^{2+} and Mg^{2+}. There was no significant variation or difference in average soil Ca^{2+} and Mg^{2+} levels between locations and treatments. Soil amendments (i.e., lime and gypsum) routinely applied to the locations was the largest sources of Ca^{2+} and Mg^{2+}. There was no significant difference in soil Ca^{2+} and Mg^{2+} levels between the Test and the Control Sites because the amendments were far greater than the Ca^{2+} and Mg^{2+} inputs from irrigation water (B. Platts, personal communication, 2010). Soil amendment data was not available.

The significant difference in average soil SAR levels between the Test and Control Sites were caused by significant differences in soil Na^+ levels, and were not offset by Ca^{2+} and Mg^{2+} levels. The SAR for the Test Sites had a greater slope compared to the Control Sites shown in Figure 30. The average SAR values at the Test Sites increased from 3.03 ± 1.40 to 3.85 ± 0.80 from 2000 to 2009. The average SAR values at the Control Sites increased from 2.19 ± 0.98 to 2.21 ± 0.44 from 2000 to 2009. The average SAR values between the Test and Control Sites were correlated with a correlation coefficient of 0.74 (data not shown). Tanji et al., 2006 found that reduced infiltration rates from the dispersion of soil colloids were caused by moderate to high SAR. EC coagulated the soil colloids, which increased the water infiltration rate and partially overcame a Na hazard. Lado et al., 2005 found that clay dispersion was mainly dependent on the SAR; the higher SAR concentration of recycled water caused more clay dispersion than the lower SAR concentration of fresh water. Calcareous soils were more suitable for irrigation waters with a high Na^+ content. The exchange of adsorbed Na^+ with soluble Ca^{2+} on the clay surface created a better physical condition that allowed Na^+ and excess salts to be leached from the root zone. All of the soils in the Test and Control Sites were calcareous (Section 3.4). The higher SAR values at the Test Sites have been acceptable for cool season vegetable production with similar crop yields and no significant changes in yields at the Test and Control Sites (B. Platts; personal communication, 2010).

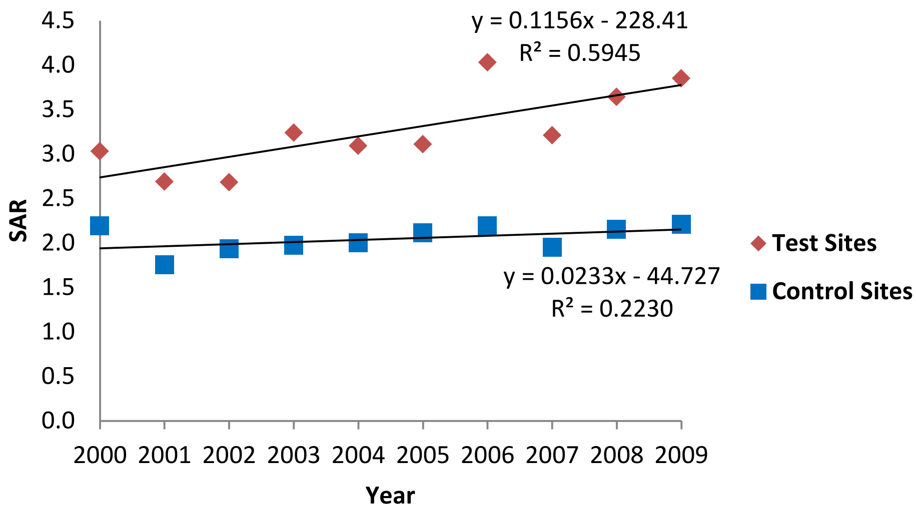

Figure 30. Average soil SAR values for Test and Control Sites in different years with trend lines.

There was a significant difference in EC_e between the Test and Control Sites. The growers in the MCWRP service area had similar fertility programs. The fertilizers used by the growers were very soluble and contributed to the overall salinity of the soil (B. Platts, personal communication, 2010). The significantly different EC_e values at the Test Sites may be due to higher Na^+ levels compared to the Control Sites. The average EC_e values at the Control and Test Sites increased during the study; the Control Sites increased from 1.36 ± 0.86 to 2.56 ± 1.63 dS/m and the Test Sites increased from 2.11 ± 1.18 to 2.47 ± 1.31 dS/m from 2000 to 2009 (Figure 31). The SAR and EC_e values were acceptable and did not appear to threaten long term soil productivity (B. Platts; personal communication, 2010; Pacific Institute, 2010).

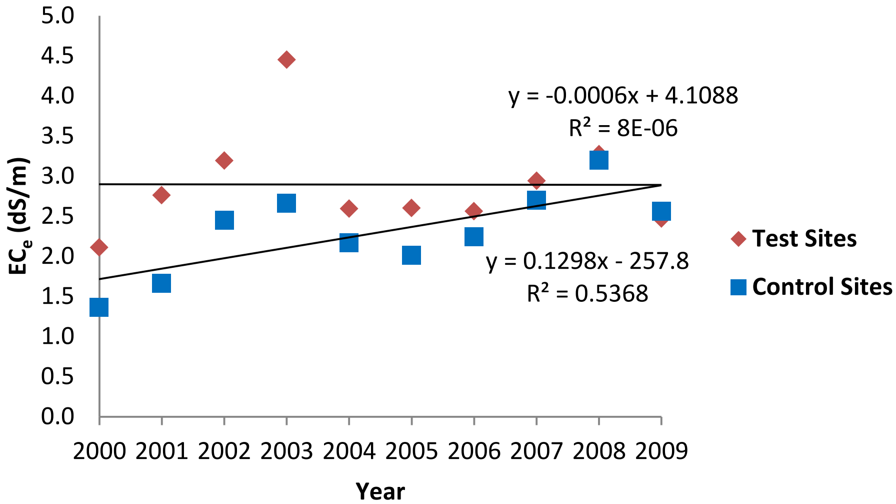

Figure 31. Average soil EC_e values for Test and Control Sites in different years with trend lines.

5.0 CONCLUSION

In the northern Salinas Valley, California, irrigation of cool season vegetables and strawberries with recycled water with a high salt content has increased soil salinity, as measured by SAR values and amount of Na^+ in the soil, compared to soils irrigated with well water with a low salt content. However, the salinity levels in the soils at the Test Sites using recycled water were less than the levels considered inhibitory to the food crops and did not appear to threaten long-term soil productivity at this time.

The significant differences in average SAR levels between the Test and Control Sites were caused by significant differences in Na^+ levels, and were not offset by Ca^{2+} and Mg^{2+} levels. Lime and gypsum routinely applied to the locations were large sources of Ca^{2+} and Mg^{2+}. The average SAR values at the Test Sites increased from 3.03 ± 1.40 to 3.85 ± 0.80 during the study. There was a negligible change in average SAR values at the Control Sites from 2000 to 2009. The average Na^+ values at the Control and Test Sites increased during the study; the Control Sites increased from 4.29 ± 2.29 to 6.39 ± 2.35 meq/L and the Test Sites increased from 7.28 ± 3.59 to 10.56 ± 4.91 meq/L. The increasing Na^+ levels during the study were expected considering salts accumulate over time in direct proportion to the rate they are applied with irrigation water (Poole et al., 2004); the amount of irrigation water applied system-wide increased from 2000 to 2004 and from 2005 to 2008. The higher SAR and Na^+ values at the Test Sites have been acceptable with no significant changes in crop yields at the locations studied (B. Platts, personal communication, 2010).

The average Na^+ values at the Test Sites accumulated in the soil over time, even though there was a small variation in the applied Test Water during the study. The average Na^+ levels at the Control Sites increased with increasing Na^+ levels in the Control Water; salts accumulated over time in direct proportion to the rate they were applied with irrigation water.

The growers in the MCWRP service area had similar fertility programs. The fertilizers used by the growers were very soluble and contributed to the overall salinity of the soil (B. Platts, personal communication, 2010). The significantly different EC_e values at the Test Sites may be due to higher Na^+ levels compared to the Control Sites.

There was no indication drainage was impeded during the study in the field at locations 1, 3/3A, and 4 (B. Platts, personal communication, 2010), but there was no significant difference in SAR, ESP, EC_e, and Na^+ levels between depths in the statistical model. There was a large amount of variation in the soil salinity data making it difficult to assess significant differences by location and depth using the statistical model. The variation in salinity data was large between years at the same site and same depth, which was expected if salts were moving down the soil profile and rainfall varied.

There was no significant variation in SAR, ESP, EC_e, and Na^+ levels between locations 1, 3/3A, and 4, which was not anticipated because the locations were diverse pertaining to soil type, drainage, and slope. There was a large amount of variation in the salinity data that significance may have been difficult to assess by location in the statistical model. The variability between years at the same site and same depth may have been larger than the variability between locations; therefore, the significant variation between locations will not be shown.

The significant difference in SAR, ESP, EC_e, and Na^+ levels between years was expected considering salts accumulate over time in direct proportion to the rate they are applied with irrigation water; the amount of irrigation water applied system-wide increased during the study.

Also, the amount of rainfall varied between years, which may affect the accumulation of salts regardless of treatment (Platts et al., 2004).

Farming management practices, soil texture, and climate were important factors in considering whether recycled water was acceptable for irrigation. The quality of recycled water for agricultural irrigation should be evaluated by agronomic standards for water quality (SAR and EC), salt sensitivity of the crops being irrigated, soil type and the amount of drainage, and irrigation methods and the amount of salts applied. Continued monitoring of the sites and proper management are necessary due to the wide range of salt sensitivities of crops grown using recycled water.

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Appendix A: Water Quality Methods and QC Results and Calculations

A.1: MRWPCA Standard Operating Procedures

1. ASTM D6919-03: Cations by Ion Chromatography

CAUTION: REVIEW ALL PERTINENT MSDS MATERIALS PRIOR TO THE PERFORMANCE OF THIS ANALYSIS.

20 mM MSA Eluent: To prepare 1 L of Eluent, use 100 mL of 0.4 M MSA concentrate and 900 mL Barnstead (0.05 μS/cm conductivity) water in a 1000 mL volumetric flask. Filter and degas for at least 30 minutes.

Standard Solutions: Prepare 6 working standard solutions from the stock cation standards, which are 1000 mg/L for sodium, potassium, magnesium and calcium. Use acid-washed 100 mL volumetric flasks. Generally, the working standard solution concentrations are: 4, 8, 12, 16, 24 and 30 mg/L. These concentrations bracket most of the samples we work with.

Sample Preparation: Highly contaminated samples must be filtered prior to dilution. Most samples are prepared using a dilution factor of 10. If you observe elevated conductivity (greater and 2000 uS/cm) a higher dilution factor may be required in order for each cation peak to fall within the range of the standards.

Sample Batch: Begin each batch of samples with 2 Barnstead water blanks, and then run a calibration curve using the 6 standards prepared above, going from lowest concentration to greatest concentration. Include a blank after the last calibration point. Add each sample, with a Blank every 6-8 samples to ensure that the instrument sensitivity does not drift.

Quality Control: Each batch must include the following Quality Control samples with the acceptance ranges shown:

Calibration Check of Standard 4: Must be within ± 15% of known value
Spike Blank (5 mg/L): Must be within ± 10% of known value
Matrix Spike/Matrix Spike Duplicate: Must be within ± 10% of known value

Operating the Ion Chromatograph: Enter the correct dilution factors, sample vial numbers, standard concentrations, and sample run times in the sample batch. Turn on the helium pressure and set the pressure control valve to ~60 psi. Activate the instrument pressure in the sample batch window and start the pump. Prime the pump by opening the waste valve and increasing the pump flow rate to 2 mL/min. Close the waste valve and return the pump flow rate to 1 mL/min. Activate the Suppressor. Allow the Ion Chromatograph to equilibrate with eluent prior to beginning the batch. Turn on the Autosampler, and begin the batch. Allow instrument to run overnight. Visually inspect each chromatogram to ensure the instrument and software are working properly. Print a sample report for each ion of interest. Perform QA/QA calculations and enter sample data.

Maintenance: The analytical columns, guard columns and internal tubing must be replaced on a regular basis. Annual preventative maintenance should be performed by a Dionex service technician.

2. EPA 300.0: Inorganic Anions by Ion Chromatography

CAUTION: REVIEW ALL PERTINENT MSDS MATERIALS PRIOR TO THE PERFORMANCE OF THIS ANALYSIS.

9.0 mM Na_2CO_3 Eluent: To prepare 1 L of Eluent, use 18 mL of 0.5 M sodium carbonate concentrate and 988 mL Barnstead (0.05 μS/cm conductivity) water in a 1000 mL volumetric flask. Filter and degas for at least 30 minutes.

Standard Solutions: Prepare 6 working standard solutions from the stock anion standards, which are 1000 mg/L for chloride, nitrate as N, nitrite as N and sulfate, and 326 mg/L for orthophosphate as P. Use acid-washed 100 mL volumetric flasks. Generally, the working standard solution concentrations are: 4, 8, 12, 16, 20 and 24 mg/L for chloride and sulfate, 0.1, 0.5, 1.2, 1.8, 2.5 and 3.2 mg/L for nitrite as N and nitrate as N, and 0.1, 0.2, 0.5, 1.0, 1.8 and 2.5 mg/L for orthophosphate as P. These concentrations bracket most of the samples we work with.

Sample Preparation: Highly contaminated samples must be filtered prior to dilution. Most samples are prepared using a dilution factor of 10. If you observe elevated conductivity (greater and 2000 uS/cm) a higher dilution factor may be required in order for each anion peak to fall within the range of the standards.

Sample Batch: Begin each batch of samples with 2 Barnstead water blanks, and then run a calibration curve using the 6 standards prepared above, going from lowest concentration to greatest concentration. Include a blank after the last calibration point. Add each sample, with a Blank every 6-8 samples to ensure that the instrument sensitivity does not drift.

Quality Control: Each batch must include the following Quality Control samples with the acceptance ranges shown:

Calibration Check of Standard 4: Must be within ± 10% of known value
Spike Blank: Must be within ± 10% of known value
Matrix Spike/Matrix Spike Duplicate: Must be within ± 10% of known value

Operating the Ion Chromatograph: Enter the correct dilution factors, sample vial numbers, standard concentrations, and sample run times in the sample batch. Turn on the helium pressure and set the pressure control valve to ~60 psi. Activate the instrument pressure in the sample batch window and start the pump. Prime the pump by opening the waste valve and increasing the pump flow rate to 2 mL/min. Close the waste valve and return the pump flow rate to 1 mL/min. Activate the Suppressor. Allow the Ion Chromatograph to equilibrate with eluent prior to beginning the batch. Turn on the Autosampler, and begin the batch. Allow instrument to run overnight. Visually inspect each chromatogram to ensure the instrument and software are working properly. Print a sample report for each ion of interest.

Maintenance: See Maintenance for SOP #1, ASTM D6919-03.

8. SM2510B: Conductivity, Laboratory Method

CAUTION: REVIEW ALL PERTINENT MSDS MATERIALS PRIOR TO THE PERFORMANCE OF THIS ANALYSIS.

Calibration: The Orion 3 Star Benchtop Meter must be calibrated each day prior to use. Calibrate with certified 1413 uS/cm Orion Calibration Standard Solution.

1. Turn the meter on by pressing POWER. Carefully lower probe stand to immerse probe into a cell filled with 1413 uS/cm Orion Conductivity Standard Solution.
   After all icons on the display screen stop blinking, press CALIBRATE once.

2. Wait for the display screen to read: ► 1 4 1 3 µS/cm
   CAL.1

3. When the arrow starts blinking, press MEASURE to accept the certified value of 1413 uS/cm, and complete the calibration.

4. The meter will automatically switch to measure mode. Calibration is complete when these icons stop blinking. Record the conductivity reading of the Calibration Standard. Verify that that value is within the established acceptance criteria.

5. Carefully raise the probe stand, rinse and dry the probe well.

Calibration Check: Prior to reading samples each day, the calibration must be checked with a Laboratory Control Standard.

1. Rinse a glass cell with an LCS Solution, and refill about half way with the Solution. Carefully lower probe to completely immerse hollow probe tip into the Solution.

2. Meter will automatically begin to measure the LCS, and reading is stable when all icons stop blinking. Record the conductivity reading of the LCS. Verify that the value is within the established acceptance criteria, ± 5% of the certified value.

3. Carefully raise the probe stand, rinse and dry the probe well. The meter is now ready to read samples.

Procedure:

1. Insert a stir bar into the sample bottle and place on a stir plate. Lower the clean/dry probe into sample, making sure to completely immerse hollow probe tip. The reading is stable when all icons stop blinking. Record the results in the bench sheet. Rinse and dry the probe well.

17. SM4500-H^+ B: pH by Electrometric Method

CAUTION: REVIEW ALL PERTINENT MSDS MATERIALS PRIOR TO THE PERFORMANCE OF THIS ANALYSIS.

Reagents:

- pH 4.00 Buffer Solution: Certified ACS Grade
- pH 4.00 Buffer Solution: Certified ACS Grade
- pH 10.00 Buffer Solution: Certified ACS Grade
- pH 7.40 Buffer Solution: Certified ACS Grade

Calibration: The Orion 3 Star Benchtop pH Meter must be calibration prior to use each day. Calibrate using ACS Grade buffers with certified values of 4.00, 7.00 and 10.00. Pour ~20 mL of each buffer solution into a 30 mL griffin beaker.

1. Turn on meter and remove blue cap from electrode fill hole 30 minutes prior to calibration. Rinse probe with distilled water, and gently dab dry with a Kimwipe. Carefully place probe into pH 4.00 Buffer Solution, and stir continuously.

2. After all icons on the display screen stop blinking, press CALIBRATE. The display screen should read: ► 04.01 pH
CAL.1
3. When the arrow starts blinking, press CALIBRATE while probe is still in pH 4.00 Buffer. Rinse and dry probe, and place into pH 7.00 Buffer Solution, and stir continuously. The display screen should now read: ► 07.01 pH
CAL.2
4. When the arrow starts blinking, press CALIBRATE while probe is still in pH 7.00 Buffer. Rinse and dry probe, and place into pH 10.00 Buffer Solution, and stir continuously. The display screen should now read: ► 10.05 pH
CAL.3
5. When the arrow starts blinking, press CALIBRATE while probe is still in pH 10.00 Buffer. The 3-point calibration is now complete. Press MEASURE to store the calibration curve and return the meter to MEASURE mode. Record the slope (SLP) shown on the display screen on pH Benchsheet. **Slope Acceptance Range = 92 – 102 %**

6. Carefully raise probe, rinse and dry well. The meter is now ready to measure samples. When not in use, store probe in Orion pH Electrode Storage Solution.

Calibration Check using a Laboratory Control Standard (LCS):

1. Pour ~20 mL of the pH 7.40 LCS standard solution into a 30 mL griffin beaker. After calibrating the meter, lower probe into sample. Stir continuously. When all icons stop blinking, measurement is complete.

2. Record result of LCS on pH bench sheet, and ensure that it falls within the acceptance range shown on the bench sheet. Acceptance range is ± 3 standard deviations from the mean value of the most recent 30 LCS determinations. This value is determined with each new lot of LCS solution. Rinse and dry the probe.

Procedure:

1. After calibrating the meter and checking the calibration, lower probe into sample. Stir sample continuously. When all icons stop blinking, measurement is complete. Record result on pH benchsheet. Rinse and dry the probe.

2. After all daily samples have been read, seal electrode fill hole with blue cap, and turn off meter by pressing and holding POWER button for 5 seconds for overnight storage.

Probe Storage:

When meter is not in use, be sure that the tip of the electrode is kept submerged only in Orion pH Electrode Storage Solution (#910001) at all times. This solution must be changed every Monday.

Weekly Electrode Cleaning Performed Every Monday:

1. Soak probe in a beaker of 0.1 M hydrochloric acid for 30 minutes, then drain reference chamber. Flush it several times with distilled water, then flush several times with fresh Reference Filling Solution.

2. Refill the chamber with fresh ROSS Reference Filling Solution (#810007). Do NOT refill electrode with solutions containing silver.

A.2: QC Results and Calculations

LCS Lot #: 076764 Mean Value: 7.43 Acceptance Range: 7.38 - 7.47

MRWPCA pH Worksheet

Date	Sample	pH	Comment	Analyst
03/30/09	2° Eff	7.3		SB
	Infl.	7.0		↓
03/31/09	std.	4, 7, 10	99.4	SB
	LCS (7.40)	7.46		
	R.O. H_2O	7.35		
	Pond	7.2		
	East	7.1		
	West	7.1		
	2° Eff	7.4		AL
	Inf.	7.3		
4/1/09	Std	4, 7, 10	99.3	[illegible]
	LCS (7.40)	7.38		
	RO H_2O	7.40		
	Pond	7.2		
	East	7.0		
	West	7.0		
	2° Eff	7.3		SB
	Inf	7.0		↓
4/2/09	std	4, 7, 10	100.6%	AH
	LCS (7.40)	7.39		
	RO H_2O	7.22		
	Pond	7.1		SB
	East	7.0		
	West	7.1		
	2° Eff	~~7.2~~ 7.3 AL		AL
	Infl	7.0		
	Brine Post Dil.	7.6		SB
04/03/09	std.	4, 7, 10	100.1	SB
	LCS (7.40)	7.44		↓

LCS Lot #: 076764 Mean Value: 7.43 Acceptance Range: 7.38 - 7.47

MRWPCA pH Worksheet

Date	Sample	pH	Comment	Analyst
05/01/09	East	6.9		JMO
	West	6.9		
	2° Eff.	7.5		SB
	Inf.	7.1		
5-2-09	STD	4, 7, 10	99.9	WF
	POND	7.4		
	EAST	7.2		
	WEST	7.2		
5.3.09	STD	4,7,10	99.7	JC
	POND	7.4		
	EAST	7.2		
	WEST	7.2		
5/04/09	cleaned probe in 0.1 M HCl	for 30min;	changed electrode	ad
	storage solution & filling solution			
	STD	4,7,10	99.5	ad
	LCS (7.40)	7.41		
	RO H_2O	7.77		
	Pond	7.4		SB
	East	7.2		
	West	7.2		
	2° Eff	7.5		
	Inf.	7.2		
05/05/09	std.	4, 7, 10	99.7	SB
	LCS (7.40)	7.42		
	R.O. H_2O	7.32		
	POND	7.3		
	EAST	7.2		
	WEST	7.1		
	2° Eff	7.5		JMO

~~Inf.~~ JMO

LCS Lot #: 076764 Mean Value: 7.43 Acceptance Range: 7.38 - 7.47

MRWPCA pH Worksheet

Date	Sample	pH	Comment	Analyst
6/15/09	Std	4,7,10	99.5	RCP
	LCS (7.40)	7.43		
	Ro H2O	7.35		
	Pond	7.2		
	East	7.0		RCP
	West	7.0		
	2° Eff	7.3		SB
	Inf	7.2		
6/16/09	Cleaned elec 30 min in		0.1 M HCl, changed	RCP
	elec storage & filling solutions.			
	Std	4,7,10	99.7	
	LCS (7.40)	7.42		
	Ro H2O	7.48		
	Pond	7.2		SB
	East	7.0		
	West	7.0		
	2° Eff	7.3		
	Brine Post DI	7.7		SD
	Inf	7.2		
6/17/09	Std	4,7,10	99.7	RCP
	LCS (7.40)	7.42		
	Ro H2O	7.12		
	Pond	7.1		SB
	East	6.9		
	West	6.9		
	2° Eff	7.2		RCP
	Inf	7.2		
06/18/09	Std	4,7,10	99.3 %	JMD
	LCS (7.40)	7.43		
	RO H2O	7.42		

LCS Lot #: 076764 Exp. Date: 01/2010 Mean: 7.43 Acceptance Range: 7.38 - 7.48

MRWPCA pH Worksheet

Date	Sample	pH	Comment	Analyst
06/26/09	West	7.0		AE
	2° Eff	7.3		[illegible]
	Inf.	7.2		↓
6-27-09	STD	4, 7, 10	99.9	WF
↓	POND	7.2		↓
	EAST	7.0		
	WEST	7.0		
6-28-09	STD	4, 7, 10	99.3	SC
↓	POND	7.3		↓
	EAST	7.0		
	WEST	7.0		
6/29/09	Cleaned electrode in 0.1 M HCl 30 min; Changed elec filling & storage solutions			Rep
	Std	4, 7, 10	99.9	↓
	LCS (7.40)	7.40		
	RO H2O	6.90		
	Pond	7.2		Rep
	East	7.0		↓
	West	7.0		
	2° Eff	7.2		AL
	Inf	7.1		↓
	3° Eff (Agronomics)	7.0		SD
6/30/09	Std	4, 7, 10	99.7	Rep
	LCS (7.40)	7.42		↓
	RO H2O	7.30		
	Pond	7.2		
	East	7.0		
	West	7.0		
	2° Eff	7.3		SB
	Inf	7.1		↓
	Brine post ~~[illegible]~~	7.7	~~99.7~~ AE	
7/1/09	Std	4.7, 10	99.7	AE ↓
	LCS (7.4)	7.41		

LCS Lot #: 076764 Exp. Date: 01/2010 Mean: 7.43 Acceptance Range: 7.38 - 7.48

MRWPCA pH Worksheet

Date	Sample	pH	Comment	Analyst
07/10/09	West	7.2		AE
	2° Eff	7.5		AL
	Inf	7.2		AL
7-11-09	STD	4,7,10	100.1	WF
↓	POND	7.3		↓
	EAST	7.0		
	WEST	7.1		
7-12-09	STD	4,7,10	99.7	JC
↓	Pond	7.2		↓
	EAST	7.0		
	WEST	7.0		
7/13/09	Std	4.7,10	99.1	AE
	LCS (7.4)	7.42		↓
	RO H_2O	7.15		
	Pond	7.2		AE ↓
	East	7.0		
	West	7.0		
	2° Eff	7.3		AL
	Inf.	7.2		
	Cleaned probe in 0.1 M HCl for 30 min, changed electrode filling solution & storage solution			AE ↓
7/14/09	Std	4.7,10	99.3	AE ↓
	LCS (7.4)	7.40		
	RO H_2O	7.31		
	Pond	7.2		AE ↓
	East	7.0		
	West	7.0		
	2° Eff	7.3		AE ↓
	Inf	7.1		
	BRINE POST Dil.	7.9		SB
7/15/09	Std	4.7,10	99.6	AE ↓
	LCS (7.4)	7.41		
	RO H_2O	7.50		

LCS Lot #: 076764 Exp. Date: 01/2010 Mean: 7.43 Acceptance Range: 7.38 - 7.48

MRWPCA pH Worksheet

Date	Sample	pH	Comment	Analyst
08/17/09	Cleaned probe in 0.1 M HCl for 30 min; Changed electrode filling solution & electrode storage solution			JMD
	Std	4,7,10	99.5%	
	LCS (7.40)	7.42		CM
	RO H_2O	7.10		
	Pond	7.3		
	East	7.2		
	West	7.1		
	2° Eff	7.52		CM
	Inf	7.3		CM
8/18/09	STA	4,7,10	99.5%	CM
	LCS (7.40)	7.41		
	RO H_2O	7.0		
	Pond	7.3		CM
	East	7.1		
	West	7.1		
	2° Eff	7.5		JMD
	Inf	7.1		
	Brine (Post-DL)	7.8		JMD
8/19/09	STA	4,7,10	99.6%	CM
	LCS (7.40)	7.43		
	RO H_2O	7.07		RBP
	Pond	7.3		RBP
	East	7.1		
	West	7.1		
	2° Eff	7.52		CM
	Inf	7.22		
8/20/09	Std	4,7,10	99.6	RBP
	LCS (7.40)	7.41		
	RO H_2O	7.24		CM
	Pond	7.32		
	East	7.11		
	West	7.13		

LCS Lot #: 076764 Exp. Date: 01/2010 Mean: 7.43 Acceptance Range: 7.38 - 7.48

MRWPCA pH Worksheet

Date	Sample	pH	Comment	Analyst
8-30-09	STD	4,7,10	99.7	JE
↓	POND	7.3		↓
	EAST	7.1		
	WEST	7.1		
8/31/09	Cleaned electrode 30 min in 0.1M HCl,			RCP
	Changed elec filling & storage solutions			
	Std	4,7,10	99.6	
	LCS (7.40)	7.43		
	RO H_2O	6.65		
	Pond	7.3		
	East	7.1		
	West	7.1		
	2° Eff	7.49		CW
	Inf	7.22		↓
09/01/09	Std	4,7,10	99.9%	JMO
	LCS (7.40)	7.40		↓
	RO H_2O	7.30		
	Pond	7.3		SB
	East	7.1		↓
	West	7.1		RCP
	Brine-Post-Dilution	7.8		JMO
	2° Eff.	7.5		↓
	Inf.	7.2		
09/02/09	STA	4,7,10	99.6%	CM
	LCS (7.40)	7.41		↓
	RO H_2O	7.43		
	Pond	7.31		↓
	East	7.16		
	West	7.13		
	2° Eff	7.5		JMO
	Inf	7.2		↓
09/03/09	Std	4,7,10	99.1%	JMO
	LCS (7.40)	7.44		↓

MRWPCA Conductivity Benchsheet

Calibration Standard		LCS	
Traceable Conductivity Standard		Oakton	
Certified Value:	**1408 ųS/cm²**	**Certified Value:**	**1413 ųS/cm²**
Lot Analysis #:	**63883**	**Lot Analysis #:**	**2804173**
Expiration Date:	**4/10/2009**	**Expiration Date:**	**Apr-09**
Mean Value:	**1418**	**Mean Value:**	**1409**
Std. Dev.:	**6**	**Std. Dev.:**	**13**
Control Limits:	**1399 - 1436**	**Control Limits:**	**1370 - 1448**

Date	Sample	uS/cm	Comment	Analyst
03/31/09	R.O. H2O	0.67		SB
	TAP H2O	460		
	Pond	1483		
	EAST	1633		
	WEST	1628		
4/1/09	Std (1408)	1418	20.6 1290	AP
	LCS (1413)	1413		
	RO H2O	0.48		
	Tap H2O	339		
	Pond	1501		
	East	1595		
	West	1599		
4/2/09	Std (1408)	~~1429~~ 1427	20.7° 1293	AH
	LCS (1413)	1434		
	RO H2O	0.38		
	Tap H2O	413		
	pond	1559		SB
	East	1728		
	West	1726		
04/03/09	Std (1408)	1424	21.0 1301	SB
	LCS (1413)	1430		
	R.O. H2O	0.6		
	TAP H2O	338		
	POND	1583		

MRWPCA Conductivity Benchsheet

Calibration Standard		LCS	
Traceable Conductivity Standard Jmd		Oakton	
Certified Value:	1413 ~~1409~~ ųS/cm²	**Certified Value:**	**1413 ųS/cm²**
Lot Analysis #:	7437 ~~7340~~ Jmd	**Lot Analysis #:**	**2806432**
Expiration Date:	**10/20/2009**	**Expiration Date:**	**6/30/2009**
Mean Value:	**TBD**	**Mean Value:**	**TBD**
Std. Dev.:	**TBD**	**Std. Dev.:**	**TBD**
Control Limits:	**TBD**	**Control Limits:**	**TBD**

Date	Sample	uS/cm	Comment	Analyst
5·3·09	STD	1421	22.0 1332	JC
	POND	1612		
	EAST.	1635		
	WEST	1644		
5/4/09	STD (1413)	1426	21.8 1327	ad
	LCS (1413)	1433		
	Pond	1602		SB
	East	1632		
	West	1633		
	RO H_2O	0.57		ad
	Tap H_2O	496		
5/5/09	STD (1413)	1421	21.8 1327	ad
	LCS (1413)	1420		
	RO H_2O	0.44		
	Tap H_2O	106.5		
	POND	1558		SB
	EAST	1621		
	WEST	1620		
05/06/09	Std (1413)	1424	22.5° 1346	Jmd
	LCS (1413)	1425		
	RO H_2O	0.56		
	Tap H_2O	90.4	Hardness 332 mg/L	
	Pond	1592		
	East	1639		

MRWPCA Conductivity Benchsheet

Calibration Standard		**LCS**	
Traceable Conductivity Standard		Oakton	
Certified Value:	**1413 ųS/cm²**	**Certified Value:**	**1413 ųS/cm²**
Lot Analysis #:	**7437**	**Lot Analysis #:**	**2806432**
Expiration Date:	**10/20/2009**	**Expiration Date:**	**6/30/2009**
Mean Value:	**TBD**	**Mean Value:**	**TBD**
Std. Dev.:	**TBD**	**Std. Dev.:**	**TBD**
Control Limits:	**TBD**	**Control Limits:**	**TBD**

Date	**Sample**	**uS/cm**	**Comment**	**Analyst**
6/15/09	Std (1413)	1426	21.7 1324	RP
	LCS (1413)	1418		
	Ro Aw	0.74		
	Tap Aw	646		
	Pond	1584		
	East	RP ~~16~~ 1597		
	West	1598		
6/16/09	Std (1413)	1423	21.8 1327	RP
	Lcs (1413)	1421		
	Ro Aw	0.47		
	Tap Aw	570		
	Pond	1546		SB
	East	1642		
	West	1641		
	2° Eff Grab	1548		RP
	Brine Post DI)	21,050		
6/17/09	Std (1413)	1422	21.7 1324	RP
	LCS (1413)	1399		
	Ro Aw	0.50		
	Tap Aw	630		
	Pond	1553		
	East	1608		
	West	1607		
06/18/09	Std (1413)	1424	21.9° 1329	JMO

MRWPCA Conductivity Benchsheet

Calibration Standard		LCS	
Traceable Conductivity Standard		Oakton	
Certified Value:	**1413 ųS/cm²**	**Certified Value:**	**1413 ųS/cm²**
Lot Analysis #:	**7437**	**Lot Analysis #:**	**2806432**
Expiration Date:	**10/20/2009**	**Expiration Date:**	**6/30/2009**
Mean Value:	**1423**	**Mean Value:**	**1427**
Std. Dev.:	**3.2**	**Std. Dev.:**	**16**
Control Limits:	**1414-1433**	**Control Limits:**	**1380-1474**

Tap Water Limit = 900 uS/cm

Date	Sample	uS/cm	Comment	Analyst
06/26/09	Tap H_2O	628		AE
	Pond	1636		
	East	1720		
	West	1720		
6-27-09	STD (1413)	1422	22.0 1332	WF
	POND	1680		
	EAST	1703		
	WEST	1700		
6-28-09	STD	1417	21.8 1327	JC
	POND	1647		
	EAST	1618		
	WEST	1613		
6/29/09	Std (1413)	1422	21.8 1327	RCP
	Lcs (1413)	1434		
	Ro H_2O	0.47		
	Tap H_2O	592		
	Pond	1589		RCP
	East	1563		
	West	1560		
	3°eff (Agronomics)	1555		SR
6/30/09	Std (1413)	1419	22.0 1332	RCP
	Lcs (1413)	1414		
	Ro H_2O	0.29		
	Tap H_2O	543		

MRWPCA Conductivity Benchsheet

Calibration Standard		LCS	
Traceable Conductivity Standard		Oakton	
Certified Value:	1413 ųS/cm^2	Certified Value:	1413 ųS/cm^2
Lot Analysis #:	7437	Lot Analysis #:	2806432
Expiration Date:	10/20/2009	Expiration Date:	6/30/2009
Mean Value:	1423	Mean Value:	1427
Std. Dev.:	3.2	Std. Dev.:	16
Control Limits:	1414-1433	Control Limits:	1380-1474

Tap Water Limit = 900 uS/cm

Date	Sample	uS/cm	Comment	Analyst
7.12.09	STD	1423	22.0 1332	Je
	POND	1674		
	EAST	1656		
	WEST	1652		
7/13/09	Std (1413)	1422	21.2 1311	AE
	LCS (1413)	1426		
	RO H_2O	0.48		
	Tap H_2O	559		
	Pond	1618		AE
	East	1594		
	West	1592		
7/14/09	std (1413)	1432	21.6 1321	AE
	LCS (1413)	1439		
	RO H_2O	0.33		
	Tap H_2O	524		
	Pond	1600		AE
	East	1661		
	West	1662		
7/15/09	std (1413)	1421	21.8 1327	AE
	LCS (1413)	1466		
	RO H_2O	0.35		
	Tap H_2O	713		
	Pond	1613		AG
	East	1694		

MRWPCA Conductivity Benchsheet

Calibration Standard		LCS	
Traceable Conductivity Standard		Oakton	
Certified Value:	1413 uS/cm^2	Certified Value:	1413 uS/cm^2
Lot Analysis #:	7437	Lot Analysis #:	2905134
Expiration Date:	10/20/2009	Expiration Date:	5/31/2010
Mean Value:	1423	Mean Value:	TBD
Std. Dev.:	3.2	Std. Dev.:	TBD
Control Limits:	1414-1433	Control Limits:	TBD

Tap Water Limit = 900 uS/cm

Date	Sample	uS/cm	Comment	Analyst
8/14/09	West	1674	22.3 1340	
8-15-09	STD (1413)	1421		WF
	POND	1636		
	EAST	1682		
	WEST	1679		
8-16-09	STD	1422	21.9 1329	Sc
	POND	1635		
	EAST	1609		
	WEST	1607	~~21.5~~ CM ~~1413~~ CM	
8.17.09	STD (1413)	CM 1425 ~~1319~~ ~~1321~~	21.9 1329	CM
	Pond	1618		
	East	1650		
	West	1649		
	LCS (1413)	1392		CM
	RO H_2O	.50		
	Tap H_2O	850		
08/18/09	Std (1413)	1423	22.1° 1335	JMD
	JMD ~~LS~~ LCS (1413)	1398		
	RO H_2O	0.49		
	Tap H_2O	815		
	Pond	1615		
	East	1662		
	West	1666		Cfp
	Brine Post-Dil.	23,570		JMD

MRWPCA Conductivity Benchsheet

Calibration Standard		LCS	
Traceable Conductivity Standard		Oakton	
Certified Value:	**1413 uS/cm²**	**Certified Value:**	**1413 uS/cm²**
Lot Analysis #:	**7437**	**Lot Analysis #:**	**2905134**
Expiration Date:	**10/20/2009**	**Expiration Date:**	**5/31/2010**
Mean Value:	**1423**	**Mean Value:**	**TBD**
Std. Dev.:	**3.2**	**Std. Dev.:**	**TBD**
Control Limits:	**1414-1433**	**Control Limits:**	**TBD**

Tap Water Limit = 900 uS/cm

Date	Sample	uS/cm	Comment		Analyst
8-30-09	STD	1419	22.9	1356	JC
	POND	1651			
	EAST	1631			
	WEST	1628			
8-31-09	STD (1413)	~~1437~~ 1420 RCP	21.8	1377	~~CM~~ RCP
	~~POND~~ LCS(1413)	~~1361~~ 1400 RCP			
	POND	1616			
	EAST	1634			
	WEST	1631			
	RO H_2O	0.54			
	TAP H_2O	880			RCP
09/01/09	Std (1413)	1424	22.1°	1335	JMD
	LCS (1413)	1395			
	~~Pond~~ RO H_2O	0.29			
	Tap H_2O	790			
	Pond	1610			SB
	East	1693			
	West	1686			RCP
	Brine Post-Dil.	18,790			JMD
	2° EFF - GRAB	1590			
09/02/09	STD (1413)	1413	21.9	1329	CM
	LCS (1413)	1394			
	RO H_2O	0.25			
	Tap H_2O	825			

SM2510 B: CONDUCTIVITY, LAB METHOD

EC_w, APRIL 2, 2009

LAB CONTROLLED STANDARD (LCS)

LCS CERTIFIED VALUE = 1413 $\mu S/cm^2$

LCS SOLUTION = 1434 $\mu S/cm^2$

$$\left(\frac{1434}{1413} - 1\right) 100 = 1.49\%$$

$\therefore$ LCS WITHIN 5% OF CERTIFIED VALUE

Sample Summary Report

Sample Name:	S1
Sequence Name:	09-01-09 Tertiary Cations
Method File Name:	NEW CATION METHOD
Date Time Collected:	9/2/2009 2:59 PM
System Operator:	jackie

No.	Name	Ret.Time min Na ECD 1	Area µS*min Na ECD 1	Height µS Na ECD 1	Amount MG/l Na ECD 1	Concentration MG/l/µL Na ECD 1
1	Blank	n.a.	n.a.	n.a.	n.a.	n.a.
2	Blank	n.a.	n.a.	n.a.	n.a.	n.a.
3	Blank	n.a.	n.a.	n.a.	n.a.	n.a.
4	S1	4.22	0.496	1.911	0.9532	0.0191
5	S2	4.18	1.483	6.353	2.8491	0.0570
6	S3	4.14	3.045	15.245	5.8488	0.1170
7	S4	4.09	4.606	24.469	8.8474	0.1769
8	S5	4.11	6.249	33.872	12.0018	0.2400
9	S6	4.14	7.905	42.857	15.1839	0.3037
10	Blank	n.a.	n.a.	n.a.	n.a.	n.a.
11	09-01-09 Tertiary (Matrix)	4.18	4.416	24.261	169.6272	3.3925
12	09-01-09 Tertiary (Matrix)	4.16	4.418	24.414	169.7065	3.3941
13	09-01-09 Tertiary (Matrix)	4.16	4.434	24.461	170.3440	3.4069
14	Blank	n.a.	n.a.	n.a.	n.a.	n.a.
15	SB (5 ppm)	4.19	2.546	12.207	4.8896	0.0978
16	SB (5 ppm)	4.20	2.563	12.284	4.9225	0.0984
17	S4 Cal Check (9 ppm)	4.14	4.688	24.890	9.0049	0.1801
18	S4 Cal Check (9 ppm)	4.14	4.690	24.871	9.0080	0.1802
19	MS	4.16	5.489	31.208	210.8550	4.2171
20	MS	4.18	5.516	31.279	211.8993	4.2380
21	MS	4.19	5.533	31.332	212.5370	4.2507
22	Blank	n.a.	n.a.	n.a.	n.a.	n.a.
23	08-22-09 CS 1	4.19	3.713	19.629	142.6113	2.8522
24	08-22-09 TS 2	4.18	1.442	6.203	55.4057	1.1081
25	08-22-09 CS 4	4.20	1.489	6.436	57.1817	1.1436
26	08-22-09 TS 8	4.21	2.854	14.392	109.6505	2.1930
27	08-29-09 CS 1	4.21	3.792	19.911	145.6684	2.9134
28	08-29-09 TS 1	4.22	4.374	23.855	168.0077	3.3602
29	08-29-09 CS 2	4.23	4.339	23.598	166.6914	3.3338
30	08-29-09 TS 2	4.22	1.394	5.893	53.5502	1.0710
31	Blank	n.a.	n.a.	n.a.	n.a.	n.a.
32	08-29-09 CS 3	4.20	1.943	8.788	74.6543	1.4931
33	08-29-09 CS 4	4.21	2.154	10.017	82.7378	1.6548
34	08-29-09 TS 5	4.21	3.954	21.242	151.9008	3.0380
35	08-29-09 TS 6	4.22	1.430	6.101	54.9445	1.0989
36	08-29-09 TS 8	4.17	4.136	22.552	158.8931	3.1779
37	Blank	n.a.	n.a.	n.a.	n.a.	n.a.
38	Blank	n.a.	n.a.	n.a.	n.a.	n.a.
39	Blank	n.a.	n.a.	n.a.	n.a.	n.a.

	Time	Area	Height	Amount	Conc.
AVERAGE:	*4.180*	*3.624*	*19.122*	*91.047*	*1.821*
STANDARD DEVIATION:	*0.036*	*1.734*	*10.202*	*76.530*	*1.531*
maximum value:	4.227	7.905	42.857	212.537	4.251
minimum value:	4.087	0.496	1.911	0.953	0.019

Sodium, corr. coeff: 99.9840%

3°: 170 mg/L

SB (5ppm): 4.91 mg/L, 98.2% recovery

S4 (9ppm): 9.01 mg/L, 100.1% recovery

MS (40ppm): 212 mg/L, 105.0% recovery

A.2 WATER QUALITY QA/QC CALCULATIONS

ASTM D6919-03: CATIONS BY ION CHROMATOGRAPHY

Na, SEPT. 2, 2009

SPIKE BLANK (SB)

SB(5 ppm): $\frac{4.91 \text{ mg/L}}{5 \text{ mg/L}} \times 100 = \underline{98.2\%}$ RECOVERY

CALIBRATION CHECK OF STANDARD 4 (S4)

S4(9 ppm): $\frac{9.01 \text{ mg/L}}{9 \text{ mg/L}} \times 100 = \underline{100.1\%}$ RECOVERY

MATRIX SPIKE (MS)

$$\% \text{ SPIKE RECOVERY} = \frac{(\text{SPIKE + SAMPLE}) - \text{SAMPLE}}{\text{SPIKE}} \times 100$$

MS (40 ppm): $\frac{211.76 \text{ mg/L} - 169.89 \text{ mg/L}}{40 \text{ mg/L}} \times 100 = \underline{104.67}\%$ RECOVERY

MATRIX SPIKE DUPLICATE

$$\frac{(210.86 - 169.63) \text{ mg/L}}{40 \text{ mg/L}} \times 100 = \underline{103.07\%}$$

$$\frac{103.07}{104.67} \times 100 = 98.5\%$$

$$\frac{(212.54 - 170.34) \text{ mg/L}}{40 \text{ mg/L}} \times 100 = \underline{105.50\%}$$

Sample Summary Report

Sample Name:	S1
Sequence Name:	09-01-09 Tertiary Cations
Method File Name:	NEW CATION METHOD
Date Time Collected:	9/2/2009 2:59 PM
System Operator:	jackie

No.	Name	Ret.Time min Ca ECD_1	Area µS*min Ca ECD_1	Height µS Ca ECD_1	Amount MG/l Ca ECD_1	Concentration MG/l/µL Ca ECD_1
1	Blank	n.a.	n.a.	n.a.	n.a.	n.a.
2	Blank	n.a.	n.a.	n.a.	n.a.	n.a.
3	Blank	n.a.	n.a.	n.a.	n.a.	n.a.
4	S1	12.34	0.532	0.348	1.0690	0.0214
5	S2	12.05	1.486	1.914	2.9855	0.0597
6	S3	11.88	2.842	4.984	5.7112	0.1142
7	S4	11.74	4.415	8.219	8.8727	0.1775
8	S5	11.75	5.982	11.505	12.0228	0.2405
9	S6	11.80	7.549	14.688	15.1720	0.3034
10	Blank	n.a.	n.a.	n.a.	n.a.	n.a.
11	09-01-09 Tertiary (Matrix)	12.07	1.410	2.097	56.6917	1.1338
12	09-01-09 Tertiary (Matrix)	12.03	1.422	2.108	57.1621	1.1432
13	09-01-09 Tertiary (Matrix)	12.08	1.470	2.137	59.0708	1.1814
14	Blank	n.a.	n.a.	n.a.	n.a.	n.a.
15	SB (5 ppm)	12.02	2.376	4.183	4.7755	0.0955
16	SB (5 ppm)	12.03	2.407	4.200	4.8367	0.0967
17	S4 Cal Check (9 ppm)	11.85	4.439	8.356	8.9207	0.1784
18	S4 Cal Check (9 ppm)	11.84	4.419	8.369	8.8814	0.1776
19	MS	11.98	2.458	4.393	98.8130	1.9763
20	MS	12.03	2.464	4.399	99.0422	1.9808
21	MS	12.04	2.500	4.417	100.5037	2.0101
22	Blank	n.a.	n.a.	n.a.	n.a.	n.a.
23	08-22-09 CS 1	11.83	7.534	14.219	302.8408	6.0568
24	08-22-09 TS 2	12.07	1.234	1.513	49.6002	0.9920
25	08-22-09 CS 4	12.17	1.112	1.196	44.7117	0.8942
26	08-22-09 TS 8	12.18	1.312	1.709	52.7177	1.0544
27	08-29-09 CS 1	11.90	7.757	14.394	311.8087	6.2362
28	08-29-09 TS 1	12.18	1.517	2.255	60.9655	1.2193
29	08-29-09 CS 2	12.21	1.584	2.220	63.6535	1.2731
30	08-29-09 TS 2	12.16	1.202	1.514	48.3092	0.9662
31	Blank	n.a.	n.a.	n.a.	n.a.	n.a.
32	08-29-09 CS 3	12.19	0.956	1.088	38.4155	0.7683
33	08-29-09 CS 4	11.88	5.431	9.928	218.2823	4.3656
34	08-29-09 TS 5	12.17	1.592	2.212	64.0000	1.2800
35	08-29-09 TS 6	12.16	1.087	1.278	43.6887	0.8738
36	08-29-09 TS 8	12.05	1.526	2.248	61.3184	1.2264
37	Blank	n.a.	n.a.	n.a.	n.a.	n.a.
38	Blank	n.a.	n.a.	n.a.	n.a.	n.a.
39	Blank	n.a.	n.a.	n.a.	n.a.	n.a.

	Time	Area	Height	Amount	Conc.
AVERAGE:	12.024	2.828	4.900	65.684	1.314
STANDARD DEVIATION:	0.154	2.157	4.358	80.256	1.605
maximum value:	12.344	7.757	14.688	311.809	6.236
minimum value:	11.744	0.532	0.348	1.069	0.021

Calcium, corr. coeff: 99.9594%

3°: 57.6 mg/L

SB (5ppm): 4.81 mg/L, 96.2% recovery

S4 (9 ppm): 8.90 mg/L, 98.9% recovery

MS (40ppm): 99.5 mg/L, 104.8% recovery

ASTM D6919-03: CATIONS BY CHROMATOGRAPHY

Ca, SEPTEMBER 2, 2009

SPIKE BLANK (SB)

SB (5ppm) : $\frac{4.81 \text{ mg/L}}{5 \text{ mg/L}} \times 100 = \underline{96.2\%}$ RECOVERY

CALIBRATION CHECK OF STANDARD 4 (S4)

S4 (9ppm) : $\frac{8.90 \text{ mg/L}}{9 \text{ mg/L}} \times 100 = \underline{98.9\%}$ RECOVERY

MATRIX SPIKE (MS)

MS (40 ppm) : $\left(\frac{99.5 \text{ mg/L} - 57.6 \text{ mg/L}}{40 \text{ mg/L}}\right) \times 100 = \underline{104.8\%}$ RECOVERY

MATRIX SPIKE DUPLICATE

$$\frac{(100.50 - 59.07) \text{ mg/L}}{40 \text{ mg/L}} \times 100 = \underline{103.58\%}$$

$$\frac{98.81 - 56.69}{40} \times 100 = \underline{105.30\%}$$

Sample Summary Report

Sample Name:	S1
Sequence Name:	09-01-09 Tertiary Cations
Method File Name:	NEW CATION METHOD
Date Time Collected:	9/2/2009 2:59 PM
System Operator:	jackie

No.	Name	Ret.Time min Mg ECD_1	Area µS*min Mg ECD_1	Height µS Mg ECD_1	Amount MG/l Mg ECD_1	Concentration MG/l/µL Mg ECD_1
1	Blank	n.a.	n.a.	n.a.	n.a.	n.a.
2	Blank	n.a.	n.a.	n.a.	n.a.	n.a.
3	Blank	n.a.	n.a.	n.a.	n.a.	n.a.
4	S1	9.81	0.674	0.593	0.7564	0.0151
5	S2	9.52	2.447	4.347	2.7475	0.0549
6	S3	9.39	5.120	11.338	5.7480	0.1150
7	S4	9.28	7.937	18.262	8.9106	0.1782
8	S5	9.29	10.641	25.183	11.9457	0.2389
9	S6	9.32	13.597	32.045	15.2646	0.3053
10	Blank	n.a.	n.a.	n.a.	n.a.	n.a.
11	09-01-09 Tertiary (Matrix)	9.72	0.787	0.913	17.6622	0.3532
12	09-01-09 Tertiary (Matrix)	9.68	0.798	0.928	17.9204	0.3584
13	09-01-09 Tertiary (Matrix)	9.72	0.813	0.936	18.2484	0.3650
14	Blank	n.a.	n.a.	n.a.	n.a.	n.a.
15	SB (5 ppm)	9.50	4.241	9.177	4.7614	0.0952
16	SB (5 ppm)	9.51	4.257	9.255	4.7796	0.0956
17	S4 Cal Check (9 ppm)	9.37	8.072	18.572	9.0619	0.1812
18	S4 Cal Check (9 ppm)	9.35	8.059	18.587	9.0476	0.1810
19	MS	9.53	2.559	5.172	57.4469	1.1489
20	MS	9.56	2.615	5.196	58.7155	1.1743
21	MS	9.57	2.586	5.202	58.0616	1.1612
22	Blank	n.a.	n.a.	n.a.	n.a.	n.a.
23	08-22-09 CS 1	9.49	4.144	9.255	93.0563	1.8611
24	08-22-09 TS 2	9.75	0.618	0.573	13.8689	0.2774
25	08-22-09 CS 4	9.84	0.468	0.372	10.5012	0.2100
26	08-22-09 TS 8	9.83	0.605	0.569	13.5875	0.2718
27	08-29-09 CS 1	9.52	4.322	9.448	97.0357	1.9407
28	08-29-09 TS 1	9.79	0.898	0.984	20.1723	0.4034
29	08-29-09 CS 2	9.81	0.899	0.971	20.1769	0.4035
30	08-29-09 TS 2	9.79	0.611	0.581	13.7091	0.2742
31	Blank	n.a.	n.a.	n.a.	n.a.	n.a.
32	08-29-09 CS 3	9.85	0.401	0.322	8.9955	0.1799
33	08-29-09 CS 4	9.54	2.197	4.205	49.3234	0.9865
34	08-29-09 TS 5	9.76	0.892	0.964	20.0364	0.4007
35	08-29-09 TS 6	9.81	0.500	0.434	11.2335	0.2247
36	08-29-09 TS 8	9.66	0.907	0.996	20.3624	0.4072
37	Blank	n.a.	n.a.	n.a.	n.a.	n.a.
38	Blank	n.a.	n.a.	n.a.	n.a.	n.a.
39	Blank	n.a.	n.a.	n.a.	n.a.	n.a.

	Time	Area	Height	Amount	Conc.
AVERAGE:	9.605	3.195	6.737	23.901	0.478
STANDARD DEVIATION:	0.185	3.441	8.383	25.526	0.511
maximum value:	9.847	13.597	32.045	97.036	1.941
minimum value:	9.277	0.401	0.322	0.758	0.015

Magnesium,
Corr. coeff: 99.9867%

3°: 17.9 mg/L

SB (5ppm): 4.77 mg/L, 95.4% recovery

S4 (9ppm): 9.05 mg/L, 100.6% recovery

MS (40ppm): 58.1 mg/L, 100.5% recovery

ASTM D6919-03: CATIONS BY CHROMATOGRAPHY

Mg, SEPTEMBER 2, 2009

SPIKE BLANK (SB)

SB (5 ppm) : $\frac{4.77\ mg/L}{5\ mg/L} \times 100 = \underline{95.4\ \%}$ RECOVERY

CALIBRATION CHECK OF STANDARD 4 (S4)

S4 (9 ppm) : $\frac{9.05\ mg/L}{9\ mg/L} \times 100 = \underline{100.6\ \%}$ RECOVERY

MATRIX SPIKE (MS)

MS (40 ppm) : $\left(\frac{58.1\ mg/L - 17.9\ mg/L}{40\ mg/L}\right) \times 100 = \underline{100.5\%}$ RECOVERY

MATRIX SPIKE DUPLICATE

$$\frac{(58.72 - 18.25)\ mg/L}{40\ mg/L} \times 100 = \underline{101.18\ \%}$$

$$\frac{57.45 - 17.66}{40} \times 100 = \underline{99.48\ \%}$$

Sample Summary Report

Sample Name:	S1
Sequence Name:	08-18-09 Tertiary, Wells, Blanco, Reclam, Sec Eff, Brine
Method File Name:	NEW ANION METHOD
Date Time Collected:	8/18/2009 4:53 PM
System Operator:	patrice

No.	Name	Ret.Time min chloride ECD_1	Area µS*min chloride ECD_1	Height µS chloride ECD_1	Amount MG/l chloride ECD_1	Concentration MG/l/µL chloride ECD_1
1	Blank	n.a.	n.a.	n.a.	n.a.	n.a.
2	S1	6.28	0.359	1.754	0.8378	0.0168
3	S2	6.31	1.475	7.329	3.4398	0.0688
4	S3	6.30	3.117	15.753	7.2698	0.1454
5	S4	6.35	4.853	24.776	11.3196	0.2264
6	S5	6.37	6.773	34.982	15.7960	0.3159
7	S6	6.34	8.997	46.330	20.9837	0.4197
8	Blank	n.a.	n.a.	n.a.	n.a.	n.a.
9	08-18-09 Tertiary (Matrix, 2	6.41	5.222	26.264	243.6025	4.8720
10	08-18-09 Tertiary (Matrix, 2	6.39	5.234	26.250	244.1671	4.8833
11	08-18-09 Tertiary (Matrix, 2	6.40	5.229	26.174	243.9173	4.8783
12	Blank	n.a.	n.a.	n.a.	n.a.	n.a.
13	08-18-09 Well 14A1 (5x)	6.37	3.996	20.004	46.5966	0.9319
14	08-18-09 Well 14A1 (5x)	6.41	4.014	19.863	46.8119	0.9362
15	08-18-09 Well 14A1 (5x)	6.40	3.998	19.737	46.6261	0.9325
16	08-18-09 Well 15A1 (5x)	6.39	3.614	17.758	42.1400	0.8428
17	08-18-09 Well 15A1 (5x)	6.43	3.641	17.720	42.4609	0.8492
18	08-18-09 Well 15A1 (5x)	6.41	3.658	17.686	42.6595	0.8532
19	Blank	n.a.	n.a.	n.a.	n.a.	n.a.
20	08-18-09 Sec Eff Grab (20x	6.42	4.372	21.322	203.9426	4.0789
21	08-18-09 Sec Eff Grab (20x	6.45	4.380	21.261	204.2909	4.0858
22	08-18-09 Sec Eff Grab (20x	6.41	4.378	21.250	204.2176	4.0844
23	08-18-09 Brine Post Dil (20	6.47	15.474	77.414	7218.1801	144.3636
24	08-18-09 Brine Post Dil (20	6.47	15.558	77.522	7256.9180	145.1384
25	08-18-09 Brine Post Dil (20	6.43	15.680	78.149	7313.9685	146.2794
26	Blank	n.a.	n.a.	n.a.	n.a.	n.a.
27	08-18-09 Blanco Ditch (50x	6.46	1.920	8.921	223.9204	4.4784
28	08-18-09 Blanco Ditch (50x	6.41	1.894	8.829	220.9028	4.4181
29	08-18-09 Blanco Ditch (50x	6.46	1.901	8.852	221.7081	4.4341
30	08-18-09 Reclamation Ditch	6.46	4.385	21.096	204.5610	4.0912
31	08-18-09 Reclamation Ditch	6.42	4.350	20.944	202.9265	4.0585
32	08-18-09 Reclamation Ditch	6.45	4.363	20.935	203.5054	4.0701
33	Blank	n.a.	n.a.	n.a.	n.a.	n.a.
34	S8	6.42	3.949	18.827	9.2095	0.1842
35	S8	6.42	3.952	18.878	9.2164	0.1843
36	S4 Calibration Check	6.40	4.814	23.299	11.2271	0.2245
37	S4 Calibration Check	6.41	4.848	23.531	11.3063	0.2261
38	MS	6.43	6.171	30.004	287.8634	5.7573
39	MS	6.40	6.176	30.024	288.0687	5.7614
40	MS	6.39	6.145	30.121	286.6201	5.7324
41	Blank	n.a.	n.a.	n.a.	n.a.	n.a.
42	Blank	n.a.	n.a.	n.a.	n.a.	n.a.
43	Blank	n.a.	n.a.	n.a.	n.a.	n.a.

	Time	Area	Height	Amount	Conc.
AVERAGE:	6.404	5.261	25.987	754.152	15.083
STANDARD DEVIATION:	0.046	3.834	18.308	2057.941	41.156
maximum value:	6.470	15.680	78.149	7313.969	146.279
minimum value:	6.284	0.359	1.754	0.838	0.017

Chloride

3°: 244 mg/L

Well 14A1: 46.7 mg/L

Well 15A1: 42.4 mg/L

Blanco: 222 mg/L

Reclamation: 204 mg/L

S8 (10ppm): 9.21 mg/L, 92.1 % recovery

S4 (12 ppm): 11.3 mg/L, 94.2 % recovery

MS (40 ppm): 288 mg/L, 110.0 % recovery

EPA 300.0: ANIONS BY CHROMATOGRAPHY

Cl, AUGUST 18, 2009

SPIKE BLANK (SB)

SB (10 ppm): $\frac{9.21 \text{ mg/L}}{10 \text{ mg/L}} \times 100 = \underline{92.1\%}$ RECOVERY

CALIBRATION CHECK OF STANDARD 4 (S4)

S4 (12 ppm): $\frac{11.3 \text{ mg/L}}{12 \text{ mg/L}} \times 100 = \underline{94.2\%}$ RECOVERY

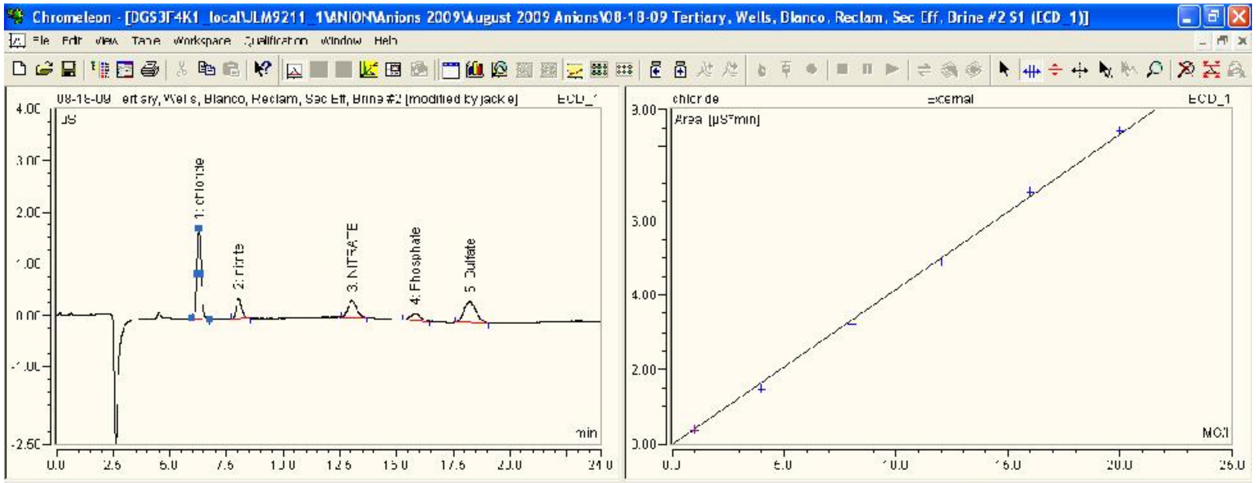
MATRIX SPIKE (MS)

MS (40 ppm): $\left(\frac{288 \text{ mg/L} - 244 \text{ mg/L}}{40 \text{ mg/L}}\right) \times 100 = \underline{110\%}$ RECOVERY

MATRIX SPIKE DUPLICATE

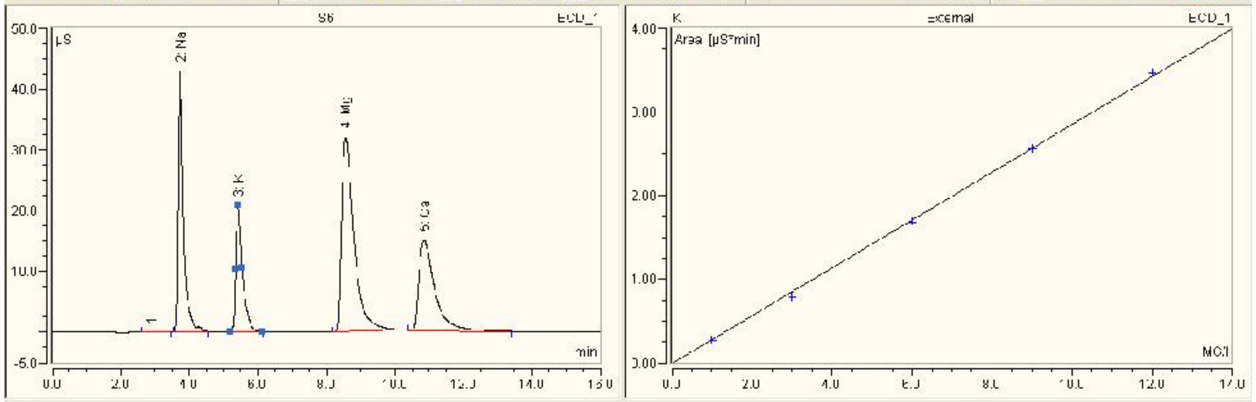
$$\frac{(288.06 - 244.17) \text{ mg/L}}{40 \text{ mg/L}} \times 100 = \underline{109.73\%}$$

$$\frac{286.62 - 243.60}{40} \times 100 = \underline{107.55\%}$$



No.	Peak Name	Cal.Type	#Points	Rel.Std.Dev. %	Corr.Coeff. %	Offset	Slope	Curve
1	chloride	Lin	6	3.1440	99.9532	0.0000	0.4166	0.0000
2	nitrite	Lin	6	3.2980	99.9533	0.0000	0.7858	0.0000
3	NITRATE	Lin	6	2.2021	99.9057	0.0000	0.9001	0.0000
4	Phosphate	Lin	6	1.5767	99.9774	0.0000	0.3174	0.0000
5	Sulfate	Lin	6	2.0713	99.9737	0.0000	0.2774	0.0000
Average:			6	2.4705	99.9689	0.0000	0.5395	0.0000

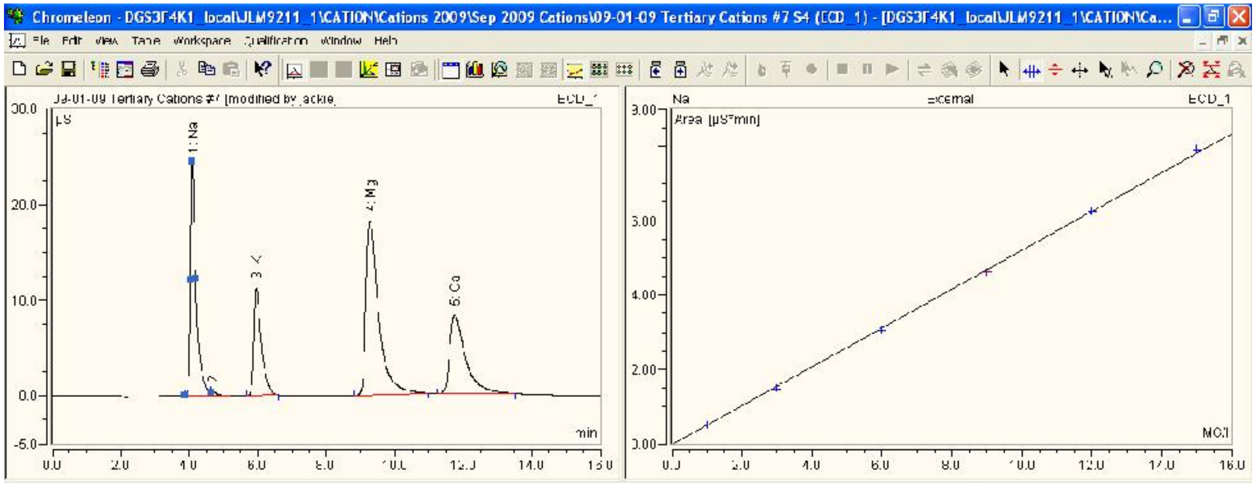
Chromeleon - DGS3F4K1_local\JLM9211_1\CATION\Cations 2009\Sep 2009 Cations\09-15-09 Blanco and reclamation Ditch Cations #9 S6 (ECD_1) - [DGS3F4K1_local\J...



A	B	C	D	E	F	G	H	I
No.	Peak Name	Cal.Type	#Points	Rel.Std.Dev. %	Corr.Coeff. %	Offset	Slope	Curve
2	Na	Lin	5	1.1180	99.9943	0.0000	0.4767	0.0000
3	K	Lin	5	2.5484	99.9788	0.0000	0.2853	0.0000
4	Mg	Lin	5	0.5242	99.9995	0.0000	0.7724	0.0000
5	Ca	Lin	5	7.4442	99.9631	0.0000	0.4520	0.0000
Average:			5	3.6587	99.9841	0.0000	0.4923	0.0000

Integration / Calibration / Peak Analysis / Summary / Audit Trail

14.9 min, -5 µS - Zoom



A	B	C	D	E	F	G	H	I
No.	Peak Name	Cal.Type	#Points	Rel.Std.Dev. %	Corr.Coeff. %	Offset	Slope	Curve
1	Na	Lin	6	1.9929	99.9940	0.0000	0.6206	0.0000
3	K	Lin	6	2.3893	99.9744	0.0000	0.3211	0.0000
4	Mg	Lin	6	3.0503	99.9057	0.0000	0.0907	0.0000
5	Ca	Lin	6	2.1485	99.9694	0.0000	0.4976	0.0000
Average:			6	2.3749	99.9761	0.0000	0.5575	0.0000

Integration / Calibration / Peak Analysis / Summary / Audit Trail

7.0 MG/l, 6.6 Area [µS*min]

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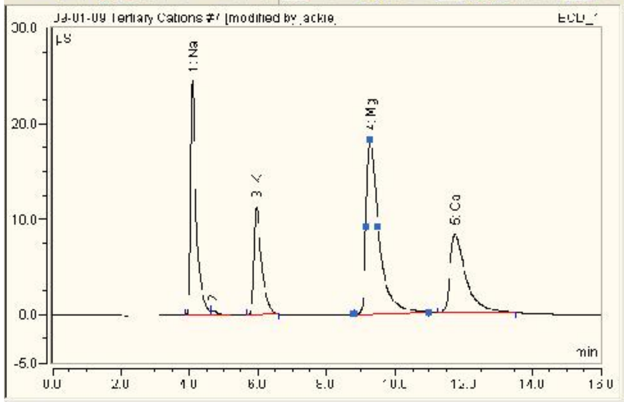
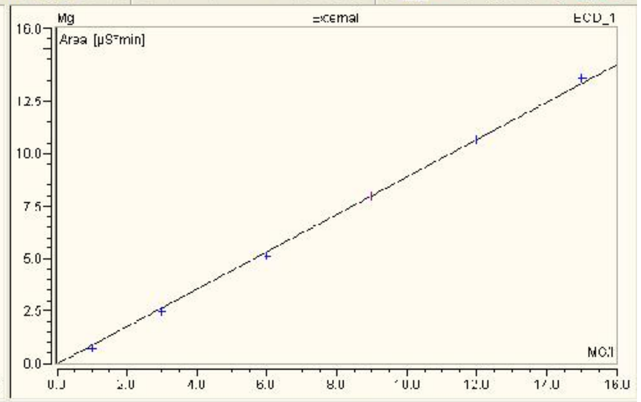
Chromeleon - [DGS3F4K1_local\JLM9211_1\CATION\Cations 2009\Sep 2009 Cations\09-01-09 Tertiary Cations #7 S4 [ECD_1]]





No.	Peak Name	Cal.Type	#Points	Rel.Std.Dev. %	Corr.Coeff. %	Offset	Slope	Curve
1	Na	Lin	6	1.9023	99.9840	0.0000	0.5206	0.0000
3	K	Lin	6	2.3893	99.9744	0.0000	0.3211	0.0000
4	Mg	Lin	6	3.0590	99.9767	0.0000	0.8907	0.0000
5	Ca	Lin	6	2.1485	99.9694	0.0000	0.4976	0.0000
Average:			6	2.3749	99.9761	0.0000	0.5575	0.0000

Integration / Calibration / Peak Analysis / Summary / Audit Trail

10.9 MG/l, 0.3 Area [µS*min]

Chromeleon - DGS3F4K1_local\JLM9211_1\CATION\Cations 2009\Sep 2009 Cations\09-01-09 Tertiary Cations #7 S4 (ECD_1) - [DGS3F4K1_local\JLM9211_1\CATION\Ca...

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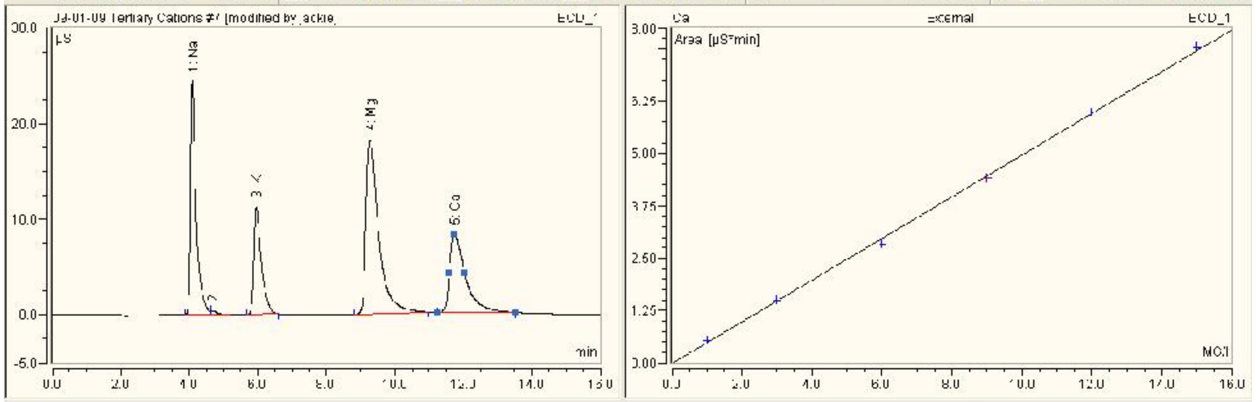

No.	Peak Name	Cal.Type	#Points	Rel.Std.Dev. %	Corr.Coeff. %	Offset	Slope	Curve
1	Na	Lin	6	1.9023	99.9840	0.0000	0.5206	0.0000
3	K	Lin	6	2.3893	99.9744	0.0000	0.3211	0.0000
4	Mg	Lin	6	3.0583	99.9057	0.0000	0.9807	0.0000
5	Ca	Lin	6	2.1496	99.9504	0.0000	0.4076	0.0000
Average:			6	2.3749	99.9761	0.0000	0.5575	0.0000

Integration / Calibration / Peak Analysis / Summary / Audit Trail

7.7 MG/l, 6.2 Area [µS*min]   rtplab

Appendix B: Water Quality Data

B.1: Water Quality Data at the Control Sites

Control Site #1

Date	Time	on/off	Hand held conductivity meter Micro Siemens	TDS	Sodium mg/l Actual	Na:EC (Hand-Held) Calc	Na:EC (On-Site) Calc	Site mounted conductivity meter Micro Siemens	GPM	PH	Operator Name	Irrigation Method	Crop Type	Crop Description	Comments
4/4/2001	905	ON	936		62	0.066		NA	1600	7.3	WF				
4/6/2001	915	ON	997	481	64	0.064		NA	400	7.5	WF	sprinkler	?	ew seeds just planted	
4/19/2001	1018	ON	846	408	59	0.070	0.070	839	1500	7.4	WF	sprinkler	LETTUCE	eeds just coming up	
4/26/2001	1129	ON	840	404	64	0.076	0.077	832	1300	7.4	WF	sprinkler			
5/1/2001	1017	ON	822	397	63	0.077	0.077	816	1300	7.4	WF	sprinkler			
5/8/2001	1122	ON	811	392	63	0.078	0.077	818	1300	7.3	WF	sprinkler	Lettuce		
5/15/2001	950	ON	1047	504	64	0.061	0.060	1061	1100	7.3	WF				
5/22/2001	1115	ON	812	392	60	0.074	0.074	808	1400	7.4	WF	SPRINKLER			
5/29/2001	934	ON	1072	517	71	0.066	0.066	1074	1400	7.4	WF	sprinkler			
6/12/2001	1025	ON	849	409	59	0.069	0.070	845	1000	7.4	WF				
6/19/2001	1147	ON	848	408	61	0.072	0.072	852	900	7.4	WF	furrow			
6/28/2001	1239	ON	848	404	60	0.071	0.071	845	1200	7.5	WF				
7/3/2001	1042	ON	853	411	60	0.070	0.070	852	950	7.4	WF				
7/12/2001	1101	ON	851	409	61	0.072	0.072	845	1050	7.4	WF	sprinkler			
7/17/2001	849	ON	870	419	63	0.072	0.073	863	1100	7.4	WF	sprinkler			
7/24/2001	940	1218	903	433	62	0.069	0.072	864	?	7.4	WF	sprinkler			Flow meter not working
8/2/2001	1220	ON	857	402	60	0.070	0.071	849	1200	7.5	WF	sprinkler			
8/7/2001	930	ON	876	413	59	0.067	0.067	877	1300	7.7	WF				
8/14/2001	1119	ON	888	417	59	0.066	0.066	896	1200	7.5	WF				
8/24/2001	928	ON	1153	542	67	0.058	0.057	1174	1250	7.3	WF	Furrow			
8/29/2001	954	ON	884	416	55	0.062	0.062	882	1200	7.5	WF	Furrow			
9/6/2001	1002	ON	1177	553	70	0.059	0.058	1207	900	7.3	WF	Furrow			
9/11/2001	1016	ON	881	414	60	0.068	0.067	897	1200	7.4	WF	Furrow			
10/2/2001	1047	ON	1244	588	79	0.064	0.062	1281	900	7.4	WF	sprinkler			
10/31/2001	1036	ON	1225	578	74	0.060	0.058	1279	1400	7.3	WF	Sprinkler			
11/6/2001	1019	ON	904	425	56	0.062	0.062	905	1100	7.4	WF	Sprinkler			
2001 Average				Na	63	0.068	0.068			7.41					
2001 Stand. Dev.					5.44					0.09					
				# Values	26	0.005	0.006								
				Max	79										
				Min	55										
4/3/2002	1108	ON	1268	592	71	0.056	0.055	1288	850	7.3	WF	Sprinkler	2" Tall Lettuce	Na Collected	
4/10/2002	1050	ON	941	448	60	0.064	0.062	962	1150	7.4	WF	Sprinkler			Na Collected
4/15/2002	952	ON	1029	485	64	0.062	0.073	877	800	7.3	WF	?			Na Collected
4/22/2002	1006	ON	994	473	62	0.062	0.061	1019	800	7.4	WF				
4/29/2002	1057	ON	973	453	62	0.064	0.064	969	1200	7.4	WF	Sprinkler			Na Collected
5/6/2002	1456	ON	1368	643	79	0.058	0.057	1396	1000	7.3	WF	Sprinkler			Na Collected
5/13/2002	1412	ON	1024	484	63	0.062	0.059	1064	1400	7.3	WF	Furrow	Lettuce	Collected 6" tall lettuce	
6/18/2002	1100	ON	1087	523	63	0.058	0.060	1044	1200	7.3	WF	Sprinkler			Na Collected
7/1/2002	1044	ON	1063	492	62	0.058	0.053	1161	1400	7.3	WF	Furrow	Lettuce	1" Tall Lettuce	Na Collected
7/9/2002	905	ON	1079	508	65	0.060	0.059	1104	1000	7.3	WF	Furrow			Na Collected
7/20/2002	1247	ON	1070	505	67	0.063	0.059	1143	1300	7.3	WF	Sprinkler			Na Collected
7/26/2002	1033	ON	1040	487	65	0.063	0.060	1086	1300	7.2	WF	Sprinkler			Na Collected
7/31/2002	1355	ON	1020	479	64	0.063	0.061	1055	1200	7.3	WF	Sprinkler			Na Collected
8/6/2002	1120	ON	1409	661	80	0.057	0.054	1493	?	7.2	WF	Sprinkler	6" tall lettuce lettuce heads size of hard balls		
8/14/2002	1047	ON	1133		66	0.058	0.057	1160	900	7.3	WF	Sprinkler			Na Collected
8/28/2002	939	ON	1094		65	0.059	0.058	1115		7.2	WF	Furrow			Na Collected
9/6/2002	1114	ON	1106	532	64	0.058	0.056	1140	1300	7.2	WF	Furrow			Na Collected
9/17/2002	937	ON	1389	674	83	0.060	0.059	1408	1100	7.2	WF	Sprinkler			Na Collected
10/3/2002	1317	ON	1129	541	73	0.065	0.063	1153	1200	7.1	WF	Sprinkler			Na Collected
2002 Average				Na	67	0.060	0.059			7.28					
2002 Stand. Dev.					6.73					0.08					
				# Values	19	0.003	0.004								
				Max	83										
				Min	60										
3/10/2003	1520	ON	1230	591	84	0.068	0.067	1251	1400	7.1	JC	Sprinkler			Na Collected
3/26/2003	1115	ON	1179	562	82	0.070	0.071	1149	1600	7.6	JC	Sprinkler	Lettuce		Na Collected
3/29/2003	1111	ON	1165	559	79	0.068	0.069	1148	1300	7.4	WF	Sprinkler	Lettuce		Na Collected
4/8/2003	1150	ON	1122	540	80	0.071	0.071	1127	1100	7.5	JC	Sprinkler	Lettuce		Na Collected
4/14/2003	1425	ON	1133	545	77	0.068	0.069	1114	1400		JC	Sprinkler	Lettuce		Na Collected
4/30/2003	1000	ON	1213	583	74	0.061	0.063	1180	1500	7.5	JC	Furrow	Lettuce		Na Collected
5/7/2003	1105	ON	1229	616	83	0.068	0.073	1137	900	7.5	JC	Sprinkler	Lettuce		Na Collected
5/13/2003	900	ON	1709		119	0.070	0.074	1605	1400	7.3	WF	Sprinkler	Lettuce	Soil Sample Taken	Harvesting Na Collected
5/18/2003	1125	ON	1368	658	87	0.064	0.064	1359	1500	7.4	JC	Sprinkler			Na Collected
5/26/2003	1127	ON	1257	604	80	0.064	0.064	1250	1300	7.5	JC				Na Collected
5/31/2003	1125	ON	1322	649	84	0.064	0.063	1325	1200	7.5	WF	Sprinkler			Na Collected
6/7/2003	1110	ON	1312	643	84	0.064	0.064	1318	1200	7.5	WF	Sprinkler			Na Collected
6/16/2003	955	ON	1313	631	81	0.062	0.061	1320	1100	7.4	JC	Sprinkler			Na Collected
6/23/2003	1101	ON	1736	835	102	0.059	0.058	1761	1100	7.4	JC	Furrow	Lettuce		Na Collected
6/28/2003	1200	ON	1329	654	79	0.059	0.059	1337	1000	7.3	WF	Sprinkler	Lettuce		Na Collected
7/8/2003	947	On	1370	670	88	0.064	0.065	1361	1050	7.2	WF	Furrow	Lettuce		Na Collected
7/14/2003	1055	ON	1434	684	83	0.058	0.057	1444	1200	7.5	JC	Sprinkler	Lettuce		Na Collected
8/2/2003	1149	ON	1253	615	87	0.069	0.069	1264	1100	7.3	WF	Furrow	Lettuce		Na Collected
8/19/2003	1058	ON	1945	953	119	0.061	0.060	1988	1000	7.3	WF	Sprinkler			Na Collected
8/29/2003	941	ON	1924	942	133	0.069	0.068	1959	1100	7.2	WF	Sprinkler			Na Collected
9/8/2003	1035	ON	1887	908	129	0.068	0.068	1906	1200	7.4	JC	Furrow			Na Collected
9/19/2003	1155	ON	1392	684	87	0.063	0.061	1434	1200	7.3	WF	Furrow			Na Collected
9/22/2003	1010	ON	1867	898	110	0.059	0.058	1887	1300	7.3	JC	Sprinkler			Na Collected
10/9/2003	1036	ON	1497	734	109	0.073	0.071	1528	1300	7.5	WF	Sprinkler			
2003 Average				Na	93	0.065	0.065			7.39					
2003 Stand. Dev.					17.52					0.13					
				# Values	24	0.004	0.005								
				Max	133										
				Min	74										
3/18/2004	930	ON	1922	939	109	0.057	0.057	1899	1000	7.4	WF	Sprinkler	cauliflower		Na Collected
4/3/2004	1102	ON	1892	931	107	0.057	0.057	1883	1200	7.4	WF	Sprinkler	cauliflower		Na Collected
4/10/2004	1105	ON	1529	749	92	0.060	0.061	1501	1200	7.5	WF	Sprinkler	cauliflower		Na Collected/Harvesting
4/24/2004	1049	ON	1524	748	94	0.062	0.063	1500	1400	7.5	WF	Sprinkler			Na Collected
5/4/2004	1125	ON	1792	860	105	0.059	0.059	1791	1400	7.4	JC	Sprinkler			Na Collected
5/8/2004	1045	ON	1659	814	94	0.057	0.057	1648	1300	7.5	WF	Sprinkler			Na Collected
5/22/2004	1300	ON	2040	1000	116	0.057	0.057	2022	1400	7.5	WF	Sprinkler			Na Collected
6/1/2004	923	ON	1932	928	113	0.058	0.059	1911	400	7.4	JC	Drip	Lettuce		Na Collected
6/5/2004	1130	ON	1692	830	105	0.062	0.063	1678	900	7.4	WF	Sprinkler	Lettuce		Na Collected
6/12/2004	1126	ON	1575	773	91	0.058	0.059	1548	1100	7.5	WF	Sprinkler	Lettuce		Na Collected
6/24/2004	1124	ON	2320	1134	122	0.053	0.053	2290	900	7.4	WF	Sprinkler	Lettuce		Na Collected

6/26/2004	1114	ON	2320	1140	124	0.053	0.054	2285	1200	7.1	WF	Sprinkler	Lettuce		Na Collected
7/6/2004	1000	ON	2280	1117	128	0.056	0.057	2242	1000	7.3	WF	Sprinkler	Lettuce		Na Collected
7/17/2004	1112	ON	1597	783	89	0.056	0.056	1576	1100	7.4	WF	Sprinkler	Lettuce		Na Collected
7/24/2004	1148	ON	1678	822	92	0.055	0.055	1662	1000	7.4	WF	Sprinkler			Na Collected
7/31/2004	1108	ON	2410	1179	119	0.049	0.050	2375	1100	7.3	WF	Furrow			Na Collected
8/7/2004	1123	ON	1668	817	93	0.056	0.056	1654	800	7.4	WF	Sprinkler			Na Collected
8/16/2004	1002	ON	2430	1165	127	0.052	0.053	2413	1200	7.2	JC	Sprinkler			Na Collected
10/11/2004	1631	ON	2420	1162	122	0.050	0.053	2308	1000	7.4	JC	Sprinkler	Lettuce		Na Collected
2004 Average				Na	107	0.056	0.057			7.39					
2004 Stand. Dev.					13.77					0.10					
				# Values	19	0.003	0.003								
				Max	128										
				Min	89										
4/27/2005	912	ON	1746	858	93	0.053	0.053	1747	1100	7.1	WF	Sprinkler	Empty		
5/1/2005	1342	ON	1718	826	86	0.050	0.050	1706	500	7.3	JC	Sprinkler	Planted		Na Collected
5/17/2005	1113	ON	1697	833	91	0.054	0.053	1709	1000	7.5	WF	Sprinkler	Lettuce		Na Collected
5/24/2005	1042	ON	2480	1214	126	0.051	0.051	2486	1000	7.5	WF	Sprinkler	Lettuce		Na Collected
5/31/2005	1450	ON	1691	812	91	0.054	0.054	1689	1200	7.5	JC	Drip	Lettuce		Na Collected
6/4/2005	1148	ON	2560	1253	127	0.050	0.049	2597	?	7.4	WF	Sprinkler	Lettuce		Na Collected
6/20/2005	1054	ON	2460	1206	115	0.047	0.046	2478	1000	7.5	WF	Sprinkler	Lettuce		Na Collected
7/6/2005	1255	ON	1741	853	93	0.053	0.053	1759	1200	7.5	WF	Sprinkler	Lettuce		Na Collected / Harvesting
7/12/2005	854	ON	1772	850	92	0.052	0.052	1763	1000	7.3	JC	Sprinkler			Na Collected
7/23/2005	1149	ON	1767	867	89	0.050	0.049	1805	1000	7.5	WF	Sprinkler			Na Collected
8/4/2005	1105	ON	1796	879	93	0.052	0.051	1814	1100	7.5	WF	Furrow			Na Collected
8/6/2005	1125	ON	1795	883	95	0.053	0.052	1822	1100	7.5	WF	Sprinkler			Na Collected
8/16/2005	1145	ON	1807	886	85	0.047	0.046	1831	1100	7.4	WF	Sprinkler			Na Collected
2005 Average				Na	98	0.051	0.051			7.42					
2005 Stand. Dev.					14.51					0.12					
				# Values	13	0.002	0.002								
				Max	127										
				Min	85										
5/3/2006	1102	ON	2050	1009	98	0.048	0.047	2099	1100	7.2	WF	Sprinkler			Na Collected
5/6/2006	1205	ON	2040	1001	109	0.053	0.053	2062	1200	7.6	WF	Sprinkler			Na Collected
5/8/2006	1454	ON	2090	995	96	0.046	0.047	2050	1500	7.2	JC	Sprinkler			Na Collected
5/28/2006	1211	ON	2044	993	106	0.052	0.051	2090	1100	7.3	JC	Sprinkler	Lettuce		Na Collected
6/4/2006	1145	ON	2130	1010	101	0.047	0.048	2088	1400	7.3	JC	Sprinkler	Lettuce		Na Collected
6/14/2006	1035	ON	2540	1244	118	0.046	0.046	2581	1200	7.4	WF	Sprinkler	Lettuce		Na Collected
6/20/2006	1110	ON	1990	975	101	0.051	0.049	2041	800	7.4	WF	Sprinkler	Lettuce		Na Collected
6/21/2006	1408	ON	2017	1066	104	0.052	0.050	2076	400	7.4	JC	Drip	Lettuce		Na Collected
6/27/2006	1355	ON	2480	1185	117	0.047	0.048	2429	1300	7.3	JC	Drip	Lettuce		Na Collected
7/22/2006	1325	ON	2010	985	111	0.055	0.053	2081	900	7.2	WF	Sprinkler			Na Collected
8/13/2006	1218	ON	2170	1076	90	0.041	0.041	2220	600	7.2	WF	Drip			Na Collected
8/19/2006	1235	ON	2260	1107	99	0.044	0.043	2324	500	7.2	WF	Furrow	Lettuce		
8/30/2006	1030	ON	2100	1056	95	0.045	0.046	2059	1300	7.5	WF	Sprinkler	Lettuce		Na Collected
9/2/2006	1135	ON	2090	1025	99	0.047	0.046	2145	1300	7.1	WF	Sprinkler	Lettuce		
9/9/2006	1210	ON	2310	1130	108	0.047	0.047	2305	?	7.2	WF	Sprinkler	Lettuce		Na Collected
9/11/2006	1220	ON	3155	1466	144	0.046	0.047	3060	600	7.1	WF	Drip	Lettuce		Na Collected
9/16/2006	1230	ON	2130	1018	111	0.052	0.052	2126	?	7.3	WF	Drip	Lettuce		Na Collected
9/23/2006	1200	ON	3010	1448	143	0.048	0.049	2940	?	6.8	WF	Sprinkler	Lettuce		
10/7/2006	1140	ON	2800	1350	140	0.050	0.048	2916	700	6.8	WF	Drip	Lettuce		
2006 Average				Na	110	0.048	0.048			7.24					
2006 Stand. Dev.					16.13					0.20					
				# Values	19	0.003	0.003								
				Max	144										
				Min	90										
3/29/2007	1130	ON	2200	1128	109	0.050	0.050	2186	1500	7.4	JC	Sprinkler	Califlower		Na Collected
4/2/2007	1453	ON	2230	1131	109	0.049	0.050	2185	1300	7.4	JC	Sprinkler	Califlower		Na Collected
4/9/2007	1015	ON	2040	987	112	0.055	0.052	2155	1200	7.4	WF	Sprinkler	Califlower		Na Collected
4/13/2007	1230	ON	2120	1013	113	0.053	0.055	2064	500	7.2	WF	Furrow	Califlower		Na Collected
4/21/2007	1320	ON	2220	1064	114	0.051	0.052	2193	1100	7.4	WF	Furrow	Califlower		Na Collected
5/2/2007	1430	ON	2310	1106	121	0.052	0.053	2277	900	7.5	WF	Furrow			Na Collected
5/6/2007	1255	ON	2360	1197	114	0.048	0.053	2170	400	7.5	JC	Sprinkler			Na Collected
5/15/2007	1430	ON	2630	1348	132	0.050	0.053	2473	600	7.3	JC	Drip			Na Collected
5/19/2007	1310	ON	2260	1147	115	0.051	0.050	2306	1200	7.3	WF	Furrow			Na Collected
5/26/2007	1345	ON	2300	1166	117	0.051	0.051	2310	600	7.3	WF	Furrow			Na Collected
6/2/2007	1055	ON	2250	1139	117	0.052	0.051	2275	600	7.5	WF	Furrow			Na Collected
6/9/2007	1305	ON	2350	1193	119	0.051	0.050	2377	1200	7.5	WF	Sprinkler	Lettuce		Na Collected
6/23/2007	1220	ON	2350	1131	126	0.054	0.051	2481	1200	7.4	WF	Sprinkler	Lettuce		Na Collected
7/3/2007	1440	ON	2850	1457	151	0.053	0.064	2350	1100	7.3	JC	Furrow	Lettuce		Na Collected
7/12/2007	1150	ON	3420	1760	178	0.052	0.051	3488	1100	7.3	WF	Sprinkler	Lettuce		Na Collected
7/17/2007	1110	ON	3330	1720	159	0.048	0.046	3442	700	7.3	JC	Sprinkler	Lettuce		Na Collected
8/4/2007	1245	ON	2370	1205	123	0.052	0.051	2392	1000	7.5	WF	Drip			Na Collected
8/16/2007	1150	ON	3260	1677	178	0.055	0.052	3400	700	7.3	WF	Drip			Na Collected
8/25/2007	1250	ON	3260	1676	182	0.056	0.054	3383	500	7.3	WF	Furrow			Na Collected
9/26/2007	1425	ON	2630	1338	132	0.050	0.047	2779	900	7.4	WF	Furrow			Na Collected
2007 Average				Na	131	0.052	0.052			7.38					
2007 Stand. Dev.					24.51					0.09					
				# Values	20	0.002	0.004								
				Max	182										
				Min	109										
3/18/2008	1220	ON	2380	1241	114	0.048	0.047	2451	1500	7.2	JC	Sprinkler			Na Collected
4/16/2008	1120	ON	3430	1767	163	0.048	0.056	2892	1400	7.2	WF	Sprinkler			Na Collected
5/5/2008	1105	ON	3001	1550	146	0.049	0.051	2869	1250	7.2	JC	Sprinkler	Lettuce		Na Collected
5/6/2008	1350	ON	2410	1221	123	0.051	0.054	2295	800	7.5	WF	Sprinkler	Lettuce		
5/12/2008	1525	ON	2440	1246	126	0.052		Probe Removed	1300	7.3	JC	Sprinkler	Lettuce		Na Collected
5/17/2008	1245	ON	2580	1316	129	0.050			1300	7.4	WF	Sprinkler	Lettuce		Na Collected
5/24/2008	1305	ON	2450	1245	129	0.053	0.097	1334	1300	7.3	WF	Sprinkler	Lettuce		Na Collected
6/2/2008	1455	ON	2420	1234	117	0.048			1300	7.4	JC	Sprinkler	Lettuce		Na Collected
6/12/2008	1245	ON	2460	1250	120	0.049	0.048	2501	1250	7.7	WF	Sprinkler			Na Collected
6/14/2008	1245	ON	2560	1303	124	0.048	0.048	2581	1200	7.7	WF	Sprinkler			Na Collected
6/21/2008	1300	ON	2460	1250	122	0.050	0.048	2560	1250	7.8	WF	Sprinkler			Na Collected
6/28/2008	1245	ON	2530	1289	125	0.049	0.049	2556	1000	7.7	WF	Sprinkler			Na Collected
7/5/2008	1135	ON	2630	1339	132	0.050	0.049	2680	1150	7.7	WF	Sprinkler			Na Collected
7/12/2008	1245	ON	2500	1272	126	0.050	0.049	2586	1400	7.7	WF	Sprinkler			Na Collected
7/26/2008	1045	ON	2490	1264	125	0.050	0.049	2528	1050	7.6	WF	Sprinkler			Na Collected
7/31/2008	1400	ON	2630	1342	131	0.050	0.049	2695	1300	7.7	WF	Sprinkler			Na Collected
8/2/2008	1140	ON	2660	1355	132	0.050	0.049	2704	1050	7.5	WF	Sprinkler			Na Collected
8/9/2008	1145	ON	2610	1330	130	0.050	0.049	2672	1200	7.8	WF	Sprinkler			Na Collected
2008 Average				Na	129	0.050	0.053			7.52					
2008 Stand. Dev.					11.05					0.22					
				# Values	18	0.001	0.012								

				Max	163										
				Min	114										
3/23/2009	1210	ON	3300	1707	176	0.053	0.054	3242	1400	7.1	JC	Sprinkler			Na Collected
4/25/2009	1315	ON	2850	1458	142	0.050	0.050	2825	1100		WF	Sprinkler	Lettuce		Na Collected
5/5/2009	1100	ON	2890	1480	139	0.048	0.048	2875	1300	7.4	WF	Sprinkler	Lettuce		Na Collected
5/9/2009	1250	ON	2830	1448	137	0.048	0.049	2824	1050	7.4	WF	Sprinkler	Lettuce		Na Collected
5/20/2009	1155	ON	2940	1504	141	0.048	0.049	2895	600	7.4	WF	Sprinkler			Na Collected
5/23/2009	1250	ON	2840	1451	136	0.048	0.047	2884	1100	7.3	WF	Sprinkler			Na Collected
6/24/2009	1411	ON	2900	1485	129	0.044	0.045	2844	1000	7.3	JC	Sprinkler			
6/30/2009	1430	ON	2900	1448	141	0.049	0.049	2884	1200	7.4	JC	Sprinkler			Na Collected
7/18/2009	1320	ON	2920	1493	135	0.046	0.047	2900	700	7.3	WF	Sprinkler			Na Collected/ Lettuce
7/27/2009	1525	ON	4170	2180	200	0.048	0.050	4013	400	7	JC	Sprinkler			Na Collected
8/12/2009	1245	ON	2940	1503	142	0.048	0.048	2953	1000	7.3	WF	Sprinkler			Na Collected
8/22/2009	1105	ON	2900	1483	143	0.049	0.050	2883	1000	7.3	WF	Sprinkler			Na Collected
8/29/2009	1100	ON	2920	1494	146	0.050	0.050	2946	1100	7.4	WF	Sprinkler			Na Collected
9/8/2009	1305	ON	3580	1850	158	0.044	0.045	3546	1100	7.3	WF	Sprinkler			Na Collected
2009 Average				Na	148	0.048	0.049			7.30					
2009 Stand. Dev.					18.93					0.12					
				# Values	14	0.002	0.002								
				Max	200										
				Min	129										

			Site Readings Controls Site #3												
Date	**Time**	**on/off**	**Hand held conductivity meter**	**TDS**	**Sodium mg/l**	Na:EC	Na:EC (On-Site)	**Site mounted conductivity meter**	**GPM**	**PH**	**Operator**	**Irrigation Method**	**Crop Type**	**Crop Description**	**Comments**
			Micro Siemens		**Actual**	Calc	Calc	**Micro Siemens**			**Name**				
3/28/2001	1140	ON	594		71	0.120	0.119	598			WF				
4/4/2001	940	ON	609		70	0.115			600	7.2	WF				
4/27/2001	953	ON	589	286	71	0.121		0	600	7.4	WF				
5/2/2001	1057	ON	580	279	71	0.122	0.370	192	600	7.2	WF				Meter calibrated
5/8/2001	1148	ON	599	289	72	0.120	0.086	840	750	7.3	WF				
5/15/2001	903	ON	599	288	70	0.117	0.109	644	700	7.1	WF				
5/22/2001	1137	ON	603	291	72	0.119	0.117	616	900	7.4	WF	SPRINKLER			
6/4/2001	1211	ON	600	289	72	0.120	0.120	599	550	7.5	WF				
6/12/2001	1104	ON	599	287	71	0.119	0.115	616	600	7.6	WF		Lettuce	2" tall Lettuce 4 leafs	
6/19/2001	1204	ON	603	290	72	0.119	0.113	636	800	7.6	WF				
6/28/2001	1318	ON	597	289	71	0.119	0.116	611	500	7.4	WF				
7/3/2001	1121	ON	609	291	71	0.117	0.119	599	900	7.5	WF			5" tall lettuce	
7/10/2001	1315	ON	611	295	74	0.121	0.124	596	200	7.5	WF				
7/17/2001	1035	ON	598	289	73	0.122	0.122	598	700	7.4	WF	sprinkler			
7/25/2001	1309	ON	597	289	71	0.119	0.114	622	600	6.9	WF	drip			Harvesting Lettuce
8/1/2001	1026	ON	597	281	70	0.117	0.114	614	300	7.3	WF	drip			soil sample taken, 2nd of year
8/15/2001	1014	ON	593	278	73	0.123	0.122	598	600	7.3	WF	Drip			
8/21/2001	1349	ON	595	279	73	0.123	0.121	604	800	7.3	WF	Sprinkler			Field Planted
9/4/2001	1021	ON	588	277	70	0.119	0.111	628	500	7.2	WF	Drip			
9/11/2001	1112	ON	594	278	70	0.118	0.110	635	700	7.3	WF	spinkler			
9/18/2001	1135	ON	592	279	74	0.125	0.119	623	600	7.3	WF	spinkler			
9/26/2001	1158	ON	588	277	74	0.126	0.117	630	700	7.4	WF				
10/10/2001	1421	ON	592	278	68	0.115	0.117	582	900	7.4	WF	Drip			
2001 Average				Na	71	0.120	0.127			7.34					
2001 Stand. Dev.					1.53					0.16					
				# Values	23	0.003	0.056								
				Max	74										
				Min	68										
5/10/2002	1041	ON	611	287	63	0.103	0.125	504	1000	7.4	WF	?			Na Collected
5/16/2002	1305	ON	667	323	68	0.102	0.110	618	600	7.3	WF	Drip			Na Collected
6/1/2002	934	ON	610	291	77	0.126	0.122	629	700	7.5	WF	Drip			Na Collected
6/5/2002	1023	ON	596	278	77	0.129	0.125	615	750	7.3	WF	Drip			Na Collected
6/17/2002	1200	ON	652	313	69	0.105	0.111	619	400	7.3	WF	Drip		1" tall lettuce seedlings	Na Collected
6/26/2002	1050	ON	622	304	67	0.108	0.108	620	550	7.3	WF	Drip			
7/1/2002	1124	ON	591	276	66	0.112	0.107	617	600	7.3	WF	Drip	Lettuce	2 1/2" Tall Lettuce	Na Collected
7/9/2002	1125	ON	599	281	70	0.117	0.113	617	350	7.2	WF	Drip			Na Collected
7/20/2002	1042	ON	590	278	70	0.119	0.112	625	600	7.3	WF	Drip			Na Collected
7/23/2002	1122	ON	584	274	70	0.120	0.117	598	600	7.3	WF	Drip			
7/25/2002	1144	ON	580	272	70	0.121	0.114	613	750	7.3	WF	Drip			Na Collected
8/6/2002	1028	ON	606	284	69	0.114	0.111	620	600	7.3	WF	Drip			Na Collected
8/15/2002	1125	ON	592	277	69	0.117	0.112	617	600	7.3	WF	Drip			Na Collected
8/20/2002	1039	ON	623	290	69	0.111	0.111	620	650	7.2	WF	Drip			Na Collected
8/28/2002	1032	ON			69		0.109	634	650	7.1	WF	Drip			Na Collected
9/12/2002	1140	ON	594	285	76	0.128	0.121	629	500	7.2	WF	DRIP			Na Collected
9/17/2002	1028	ON	617	294	74	0.120	0.118	628	700	7.2	WF	Drip			Na Collected
9/25/2002	1251	ON	605	288	78	0.129	0.181	430	400	7	WF	Drip			Na Collected
10/10/2002	1343	ON	614	296	90	0.147	0.149	604	600	7.1	WF	Drip			Na Collected
10/17/2002	1156	ON	604	290	89	0.147	0.150	595	500	7.1	WF	Drip			Na Collected
2002 Average				Na	72	0.120	0.121			7.25					
2002 Stand. Dev.					7.02					0.11					
				# Values	20	0.013	0.018								
				Max	90										
				Min	63										
3/20/2003	1235	ON	551	263	77	0.140	0.127	605	700	7.1	WF	Sprinkler			Na Collected
4/4/2003	1358	ON	575	282	78	0.136	0.127	612	300	7.4	WF	Sprinkler			Na Collected
4/10/2003	1111	ON	585	281	78	0.133	0.130	601	900	7.4	WF	Sprinkler			Na Collected
4/15/2003	954	ON	583	281	78	0.134	0.129	606	950	7.5	WF	Sprinkler			Na Collected Planted 4/15/03
4/21/2003	1027	ON			78		0.127	612	400		WF	Sprinkler			Na Collected
5/6/2003	1605	ON	593	298	89	0.150	0.151	588	400	7.1	JC	Drip	Cabbage		Na Collected
5/10/2003	1146	ON	593		77	0.130	0.127	607	750	7.5	WF	Drip	Cabbage		Na Collected
5/18/2003	1350	ON	590	284	97	0.164	0.161	601	700	7.5	JC	Drip	Cabbage		Na Collected
5/24/2003	1249	ON	597	293	78	0.131	0.128	609	700	7.6	WF	Drip	Cabbage		Na Collected
6/2/2003	1545	ON	593	285	82	0.138	0.134	613	700	7.5	JC	Drip	Cabbage		Na Collected
6/8/2003	1530	ON	629	302	83	0.132	0.134	618	700	7.5	JC	Drip	Cabbage		Na Collected
6/14/2003	1332	ON	594	290	82	0.138		?	950	7.3	WF	Drip	Cabbage		Na Collected
6/21/2003	1327	ON	594	290	79	0.133	0.127	620	800	7.3	WF	Drip	Cabbage		Na Collected
6/28/2003	1437	ON	590	290	78	0.132	0.126	620	700	7.3	WF	Drip	Cabbage		Na Collected
7/6/2003	1500	ON	597	284	81	0.136	0.129	627	600	7.6	JC	Drip	Cabbage		Na Collected
7/13/2003	1230	ON	589	283	79	0.134	0.127	623	800	7.6	JC	Drip	Cabbage		Na Collected
7/19/2003	1430	ON	597	292	86	0.144	0.138	625	600	7.3	WF	Sprinkler	Cabbage		Na Collected
7/26/2003	1345	ON	596	293	96	0.161	0.154	622	650	7.4	WF	Sprinkler	Cabbage		Na Collected
8/2/2003	1125	ON	595	291	85	0.143	0.138	616	750	7.2	WF	Sprinkler	Cabbage		Na Collected
8/9/2003	1321	ON	603	294	85	0.141	0.138	617	550	7.3	WF	Drip			Na Collected
8/28/2003	936	ON	586	297	97	0.166	0.157	619	600	7.3	WF	Drip			Na Collected
8/30/2003	1400	ON	609	299	96	0.158	0.157	613	600	7.2	WF	Sprinkler			Na Collected
9/6/2003	1332	ON	586	287	86	0.147	0.143	600	900	7.3	WF	Drip			Na Collected
9/13/2003	1351	ON	597	295	88	0.147	0.149	590	800	7.2	WF	Drip	Lettuce		Na Collected
9/20/2003	1143	ON	596	293	80	0.134	0.137	585	750	7.4	WF	Drip	Lettuce		Na Collected
9/27/2003	1224	ON	587	288	81	0.138	0.140	579	600	7.3	WF	Drip	Lettuce		Na Collected
10/11/2003	1245	ON	590	288	75	0.127		269?	750	7.4	WF	Drip	Lettuce		Na Collected
10/18/2003	1424	ON	585	288	75	0.128	0.121	618	550	7.7	WF	Drip	Lettuce		Na Collected
10/24/2003	1141	ON	578	286	79	0.137	0.132	600	700	7.8	WF	Drip	Lettuce		
10/28/2003	1131	ON	585	288	69	0.118	0.109	635	800	7.6	WF	Drip	Lettuce		Na Collected
11/5/2003	1123	ON	591	284	71	0.120	0.076	929	600	7.5	JC	D	Lettuce		Na Collected
2003 Average				Na	82	0.139	0.134			7.40					
2003 Stand. Dev.					7.18					0.17					
				# Values	31	0.012	0.016								
				Max	97										
				Min	69										
4/2/2004	1300	ON	610	299	80	0.131	0.134	598	300	7.6	WF	DRIP	Empty		Na Collected
4/7/2004	1138	ON	609	299	80	0.131	0.133	603	300	7.8	WF	DRIP	Empty		Na Collected
4/13/2004	1012	ON	615	302	83	0.135	0.137	607	400	7.6	WF	DRIP	Empty		Na Collected
4/19/2004	1080	ON	593	285	81	0.137	0.135	600	900	7.4	JC	Sprinkler	Empty		Na Collected
4/26/2004	1144	ON	594	285	83	0.140	0.141	588	800	7.6	JC	DRIP	Empty		Na Collected
5/11/2004	1334	ON	610	299	79	0.130	0.130	607	600	7.5	WF	Drip			Na Collected
5/15/2004	1310	ON	607	297	81	0.133	0.134	603	600	7.6	WF	Drip	Lettuce		Na Collected
5/22/2004	1110	ON	607	297	82	0.135	0.135	607	350	7.6	WF	Drip	Lettuce		Na Collected
5/29/2004	1355	ON	602	296	80	0.133	0.133	603	600	7.4	WF	Drip	Lettuce		Na Collected
6/5/2004	1326	ON	602	295	86	0.143	0.143	601	600	7.6	WF	Drip	Lettuce		Na Collected
6/14/2004	1140	ON	594	286	84	0.141	0.139	604	700	7.5	JC	Sprinkler	Lettuce		Na Collected
6/19/2004	1200	ON	605	296	86	0.142	0.142	604	550	7.8	WF	Drip	Lettuce		Na Collected
7/2/2004	1340	ON	601	294	82	0.136	0.088	936	500	7.5	WF	Drip	Lettuce		Na Collected/meter reset
7/5/2004	1400	ON	594	286	86	0.145	0.114	756	500	7.5	JC	Drip	Lettuce		Na Collected
7/10/2004	1425	ON	601	295	87	0.145	0.144	605	500	7.5	WF	Drip	Lettuce		Na Collected

7/20/2004	1040	ON	601	295	76	0.126	0.077	987	500	7.6	WF	Drip			Soil Sample Taken / Na Collected
7/26/2004	1530	ON	616	296	77	0.125		0	500	7.4	JC	Drip			Na Collected
8/7/2004	1350	ON	599	296	80		0.158	506	600	7.5	WF	Drip			Na Collected
8/16/2004	1120	ON	617	296	84	0.136		meter down	800	7.4	JC	Drip			Na Collected
8/28/2004	1321	ON	603	294	86	0.143	0.139	618	750	7.6	WF	Drip	Broccoli		Na Collected
10/2/2004	1325	ON	605	295	74	0.122	0.119	620	550	7.5	WF	Drip	Broccoli		Na Collected
10/12/2004	1059	ON			74		0.120	619	550		JC	Drip	Broccoli		Na Collected
10/13/2004	1207	ON	613	294	77	0.126	0.128	601	900	7.5	JC	Sprinkler	Broccoli		Na Collected
10/16/2004	1309	ON	597	293	76	0.127	0.123	618	600	7.4	WF	Drip	Broccoli		Na Collected
2004 Average				Na	81	0.135	0.129			7.54					
2004 Stand. Dev.					3.91					0.11					
				# Values	24	0.007	0.018								
				Max	87										
				Min	74										
4/23/2005	1450	ON	610	299	75	0.123	0.131	571	800	7.6	WF	Drip	Lettuce		Na Collected
5/2/2005	1435	ON	604	296	75	0.124	0.127	591	650	7.6	WF	Drip	Lettuce		Na Collected
5/9/2005	1517	On	607	292	75	0.124	0.136	550	900	7.3	JC	Drip	Lettuce		Na collected
5/16/2005	1307	ON	604	297	75	0.124	0.117	640	850	7.6	WF	Drip	Lettuce		
5/21/2005	1253	ON	609	297	75	0.123	0.121	621	900	7.6	WF	Drip	Lettuce		Na collected
5/30/2005	1348	ON	602	289	78	0.130	0.117	669	1100	7.6	JC	Drip	Lettuce		Na collected
6/11/2005	1310	ON	609	298	72	0.118	0.113	636	1000	7.5	WF	Drip	Lettuce		Na collected
6/15/2005	1509	ON	609	298	111	0.182	0.171	649	500	7.6	WF	Drip	Lettuce		
6/25/2005	1340	ON	606	298	78	0.129	0.123	632	800	7.5	WF	Sprinkler			Na collected
7/2/2005	1430	ON	606	292	75	0.124	0.118	635	850	7.3	JC	Drip			Na collected
7/5/2005	1054	ON	659	323	75	0.114	0.110	682	800	7.4	WF	Drip			
7/16/2005	1356	ON	613	300	73	0.119	0.121	604	1100	7.5	WF	Drip			Na collected
7/23/2005	1442	ON	612	301	74	0.121	0.121	613	1000	7.7	WF	Drip			Na collected
7/30/2005	1425	ON	640	313	66	0.103	0.103	638	1000	7.4	WF	Drip			Na collected
8/6/2005	1426	ON	620	303	95	0.153	0.144	659	1000	7.6	WF	Drip		Califlower	Na collected
8/13/2005	1353	ON	652	320	70	0.107	0.105	664	1000	7.4	WF	Drip		Califlower	Na collected
8/20/2005	1139	ON	638	306	75	0.118	0.120	625	1000	7.4	JC	Sprinkler		Califlower	Na collected
8/27/2005	1350	ON	627	305	73	0.116	0.117	626	950	7.5	WF	Drip		Califlower	Na collected
2005 Average				Na	77	0.125	0.123			7.51					
2005 Stand. Dev.					10.14					0.12					
				# Values	18	0.018	0.016								
				Max	111										
				Min	66										
5/20/2006	1332	ON	636	311	80	0.126	0.123	652	550	7.7	WF	Drip			Na Collected
5/27/2006	1342	ON	644	315	81	0.126	0.150	539	900	7.5	WF	Drip	Lettuce		Na Collected
6/6/2006	1600	ON	706	335	76	0.108	0.109	695	800	7.4	JC	Drip	Lettuce		
6/10/2006	1545	ON	653	320	78	0.119	0.114	687	700	7.4	WF	Drip	Lettuce		Na Collected
6/20/2006	1153	ON	656	322	84	0.128	0.116	725	800	7.5	WF	Drip	Lettuce		Na Collected
6/25/2006	1140	ON	672	319	82	0.122	0.123	668	650	7.6	JC	Drip	Lettuce		Na Collected
7/5/2006	1055	ON	668	327	82	0.123	0.117	701	550	7.6	WF	Drip	Lettuce		Na Collected
7/8/2006	1405	ON	661	324	84	0.127	0.121	697	750	7.3	WF	Drip	Lettuce		Na Collected
7/15/2006	1405	ON	670	327	86	0.128	0.129	669	450	7.4	WF	Drip	Lettuce		
8/19/2006	1335	ON	680	334	74	0.109	0.107	694	500	7.5	WF	Drip			Na Collected
8/26/2006	1410	ON	681	334	75	0.110	0.117	641	750	7.1	WF	Drip			Na Collected
9/11/2006	1350	ON	689	330	80	0.116	0.124	646	500	7.3	WF	Drip	Lettuce		Na Collected
9/16/2006	1420	ON	692	331	78	0.113	0.119	657	900	7.3	WF	Drip	Lettuce		Na Collected
10/7/2006	1410	ON	680	328	83	0.122	0.119	700	500	7.1	WF	Drip	Lettuce		
2006 Average				Na	80	0.120	0.120			7.41					
2006 Stand. Dev.					3.62					0.18					
				# Values	14	0.007	0.010								
				Max	86										
				Min	74										
5/19/2007	1500	ON	723	353	86	0.119	0.123	702	600	7.3	WF	Sprinkler			Na Collected
7/12/2007	1045	ON	730	356	86	0.118	0.112	766	500	7.5	WF	Drip			Na Collected
7/26/2007	1445	ON	737	360	86	0.117	0.473	182	600	7.7	WF	Drip			Na Collected
8/4/2007	1505	ON	713	349	86	0.121	0.093	929	600	7.6	WF	Sprinkler	Lettuce		Na Collected
8/15/2007	1325	ON	727	356	93	0.128	0.117	793	500	7.5	JC	Sprinkler	Lettuce		Na Collected
9/27/2007	1120	ON	648	234	80	0.123	0.113	710	600	7.5	JC	Sprinkler	Lettuce		Na Collected
10/14/2007	1135	ON	657	321	80	0.122	0.103	778	250	7.7	JC	Drip			Na Collected
2007 Average				Na	85	0.121	0.162			7.54					
2007 Stand. Dev.					4.42					0.14					
				# Values	7	0.004	0.137								
				Max	93										
				Min	80										
4/5/2008	1420	ON	648	316	80	0.123	0.117	683	550		WF	Sprinkler			Na Collected
5/2/2008	1330	ON	655	324	78	0.119	0.108	720	300	7.6	WF	Sprinkler			Na Collected
5/14/2008	1535	ON	669	326	82	0.123	0.109	752	400	7.5	WF	Sprinkler			Na Collected
5/17/2008	1430	ON	683	333	83	0.122	0.116	717	550	7.5	WF	Drip			Na Collected
6/18/2008	1245	ON	687	335	78	0.114		well breaking suction		7.6	WF	Sprinkler			Na Collected
7/16/2008	1145	ON	656	319	75	0.114	0.106	707	700	7.7	WF	Sprinkler			Na Collected
7/30/2008	1530	ON	665	324	78	0.117	0.125	626	600	7.6	WF	Sprinkler			Na Collected
8/7/2008	1535	ON	674	328	78	0.116	0.116	674	500	7.7	WF	Sprinkler			Na Collected
2008 Average				Na	79	0.118	0.114			7.60					
2008 Stand. Dev.					2.56					0.08					
				# Values	8	0.004	0.006								
				Max	83										
				Min	75										
4/25/2009	1440	ON	645	314	73	0.113	0.104	704	550	7.6	WF	Sprinkler	Lettuce		Na Collected
5/6/2009	1040	ON	643	313	72	0.112	0.102	703	400	7.5	WF	Sprinkler	Lettuce		Na Collected
5/11/2009	1330	ON	662	323	73	0.110	0.109	667	550	7.3	JC	Drip	Lettuce		Na Collected
5/16/2009	1345	ON	634	313	74	0.117	0.103	717	600	7.7	WF	Drip			Na Collected
5/23/2009	1410	ON	656	320	74	0.113	0.109	680	500	7.6	WF	Sprinkler			Na Collected
7/11/2009	1350	ON	675	329	76	0.113	0.104	729	300	7.5	WF	Sprinkler			Na Collected
8/2/2009	1440	ON	658	320	79	0.120	0.097	812	400	7.5	WF	Sprinkler			Na Collected
8/15/2009	1415	ON	656	319	74	0.113	0.112	660	500	7.5	WF	Sprinkler			Na Collected
8/29/2009	1400	ON	646	314	75	0.116	0.133	566	450	7.6	WF	Sprinkler			Na Collected
9/22/2009	1510	ON	634	310	74	0.117	0.131	563	300	7.3	JC	Sprinkler			Na Collected
2009 Average				Na	74	0.114	0.111			7.51					
2009 Stand. Dev.					1.96					0.13					
				# Values	10	0.003	0.012								
				Max	79										
				Min	72										

Site Readings
Controls Site #4

Date	Time	on/off	Hand held conductivity meter Micro Siemens	TDS	Sodium mg/l Actual	Na:EC Calc	Na:EC (On-Site) Calc	Site mounted conductivity meter Micro Siemens	GPM	PH	Operator Name	Irrigation Method	Crop Type	Crop Description	Comments
3/23/2001		ON	2580/LAB METER		97	0.038	0.031	3149							
3/29/2001	1010	ON	2510		94	0.037	0.030	3095	1500	7.3	WF	Sprinkler	Artichokes		
7/7/2001	915	ON	2430	1170	93	0.038	0.039	2406	1500	6.8	WF	sprinkler			
9/11/2001	1036	ON	2290	1088	92	0.040	0.039	2385	1500	6.9	WF	sprinkler			
2001 Average				Na	94	0.038	0.035			7.00					
2001 Stand. Dev.					2.16					0.26					
				# Value	4	0.001	0.005								
				Max	97										
				Min	92										
4/8/2002	1336	ON	2510	1193	97	0.039				7.3	WF	Sprinkler			too wet to get to meter, Na Collected
4/30/2002	1107	ON	2560	1204	100	0.039				7.0	WF				Na Collected
7/11/2002	1130	ON			94						WF				Na collected
2002 Average				Na	97	0.039				7.15					
2002 Stand. Dev.					3.00					0.21					
				# Value	3	0.000									
				Max	100										
				Min	94										
4/16/2003	1001	ON	2430	1174	114	0.047				7.4	WF	Sprinkler	Artichokes		
4/23/2003	1200	ON	2370	1138	116	0.049				7.3	WF	Sprinkler	Artichokes		Na Collected
7/4/2003	1148	ON	2340	1148	122	0.052	0.053	2292	1500	6.9	WF	Sprinkler	Artichokes		Na Collected
7/5/2003	1202	ON	2370	1158	121	0.051	0.051	2394	1500	6.9	WF	Sprinkler	Artichokes		Na Collected
8/16/2003	1332	ON	2250	1097	125	0.056	0.055	2289	1500	7.0	WF	Sprinkler	Artichokes		Na Collected
9/6/2003	1143	ON	2200	1076	123	0.056	0.056	2213	1500	6.9	WF		Artichokes		Na Collected
2003 Average				Na	120	0.052	0.053			7.07					
2003 Stand. Dev.					4.26					0.23					
				# Value	6	0.004	0.002								
				Max	125										
				Min	114										
3/20/2004	1118	ON	2530	1244	116	0.046		too wet		7.5	WF	Sprinkler	Artichokes		Na Collected
4/1/2004	1040	ON	2530	1238	117	0.046	0.047	2485	1500	7.2	WF	Sprinkler	Artichokes		Na Collected
4/3/2004	1123	ON	2540	1237	121	0.048		Too Wet	Same	7.4	WF	Sprinkler	Artichokes		Na Collected
4/16/2004	957	ON	2530	1239	119	0.047	0.048	2477	1500	7.0	WF	Sprinkler	Artichokes		
6/12/2004	1147	ON	2180	1069	106	0.049	0.049	2163	1500	7.0	WF	Sprinkler	Artichokes		Na Collected
7/4/2004	1110	ON	2250	1079	115	0.051	0.052	2232	1500	6.9	JC	Sprinkler	Artichokes		Na Collected
8/11/2004	1117	ON	2040	1002	106	0.052	0.052	2026	1550	7.1	WF	Sprinkler	Artichokes		Na Collected
9/30/2004		ON	2160	1064	109	0.050		Too Wet	?	7.4	WF	Sprinkler	Artichokes		Na Collected
2004 Average				Na	114	0.049	0.050			7.19					
2004 Stand. Dev.					5.85					0.22					
				# Value	8	0.002	0.002								
				Max	121										
				Min	106										
4/27/2005	928	ON	2370	1162	109	0.046	0.046	2359	1500	7.0	WF	Sprinkler	Artichokes		Na Collected
7/23/2005	1240	ON	2120	1048	98	0.046	0.046	2129	1500	7.1	WF	Sprinkler	Artichokes		Na Collected
8/13/2005	1145	ON	2100	1082	98	0.047	0.046	2126	1450	7.1	WF	Sprinkler	Artichokes		Na Collected
2005 Average				Na	102	0.046	0.046			7.07					
2005 Stand. Dev.					6.35					0.06					
				# Value	3	0.000	0.000								
				Max	109										
				Min	98										
6/10/2006	1300	ON	2150	1055	100	0.047	0.046	2170	1500	7.0	WF	Sprinkler	Artichokes		Na Collected
9/2/2006	1200	ON	2020	988	92	0.046	0.045	2045	1500	6.8	WF	Sprinkler	Artichokes		Na Collected
2006 Average				Na	96	0.046	0.046			6.90					
2006 Stand. Dev.					5.66					0.14					
				# Value	2	0.001	0.001								
				Max	100										
				Min	92										
6/8/2007	955	ON	1955	985	86	0.044				7.3	WF	Sprinkler	Artichokes		Na Collected
6/9/2007	1340	ON	2073	1047	100	0.048	0.050	2002	1500	7.1	WF	Sprinkler	Artichokes		Na Collected
8/11/2007	1335	ON	2084	1052	98	0.047	0.049	2014	1500	7.1	WF	Sprinkler	Artichokes		Na Collected
10/20/2007	1405	ON	2111	1066	105	0.050		too wet		7.6	WF	Sprinkler	Artichokes		Na Collected
2007 Average				Na	97	0.047	0.049			7.28					
2007 Stand. Dev.					8.06					0.24					
				# Value	4	0.002	0.001								
				Max	105										
				Min	86										
3/24/2008	1445	ON	2179	1109	103	0.047	0.047	2174	1500	7.1	JC	Sprinkler	Artichokes		Na Collected
4/1/2008	1105	ON	2190	1116	104	0.047	0.048	2182	1600	7.1	JC	Sprinkler	Artichokes		Na Collected
4/11/2008	1125	ON	2147	1036	105	0.049	0.049	2158	1550	7.1	WF	Sprinkler	Artichokes		Na Collected
4/17/2008	1325	ON	2184	1106	108	0.049		Too Wet		7.4	WF	Sprinklers	Artichokes		
4/23/2008	1410	ON	2148	1086	112	0.052	0.051	2178	1500	7.1	WF	Sprinkler	Artichokes		Na Collected
4/25/2008	1200	ON	2156	1090	112	0.052	0.051	2185	1550	7.2	WF	Sprinkler	Artichokes		
2008 Average				Na	107	0.050	0.049			7.17					
2008 Stand. Dev.					3.98					0.12					
				# Value	6	0.002	0.002								
				Max	112										
				Min	103										
5/19/2009	1155	ON	1810	916	80	0.044	0.044	1818	900	7.4	JC	Sprinkler			Na Collected
7/16/2009	1255	ON	1785	896	78	0.044	0.044	1774	900	7.1	WF	Sprinkler			Na Collected
8/3/2009	1315	ON	1788	902	84	0.047	0.047	1785	1400	7.0	JC	Sprinkler			Na Collected
8/7/2009	1410	ON	1787	897	80	0.045	0.045	1760	1200	7.0	WF	Sprinkler			Na Collected
8/12/2009	1305	ON	1801	905	80	0.044	0.045	1792	1200	7.0	WF	Sprinkler			Na Collected
8/29/2009	1245	ON	1790	899	83	0.046	0.048	1735	1500	7.1	WF	Sprinkler			Na Collected
2009 Average				Na	81	0.045	0.045			7.10					
2009 Stand. Dev.					2.23					0.15					
				# Value	6	0.001	0.002								
				Max	84										
				Min	78										

B.2: Water Quality Data at the Test Sites

Site Readings

Turnout #126a Test Site#1

Date	Time	on/off	Hand held conductivity meter Micro Siemens	TDS	Sodium mg/l Actual	Na:EC Calc	Na:EC (On-Site) Calc	Site mounted conductivity meter Micro Siemens	GPM	PH	Operator Name	Irrigation Method	Crop Type	Crop Discription	Comments
4/4/2001	845	ON	610	575	51	0.084			1500	7.6	WF				
4/12/2001	1152	ON	1023	492	101	0.099	0.103	981	1600	7.6	WF	sprinkler			
4/18/2001	900	ON	1568	755	167	0.107	0.107	1567	1100	7.2	WF	sprinkler			
4/24/2001	936	ON	1531	736	160	0.105	0.106	1514	1300	7.2	WF	sprinkler			
4/28/2001	1011	ON	1656	799	182	0.110	0.110	1653	1100	7.3	WF	sprinkler			
5/1/2001	1008	ON	1550	747	169	0.109	0.109	1555	1200	7.4	WF	sprinkler			
5/10/2001	947	ON	1214	585	125	0.103	0.099	1269	900	7.4	WF	sprinkler			
5/15/2001	942	ON	1567	751	160	0.102	0.103	1552	1200	7.3	WF	sprinkler			
5/22/2001	1105	ON	1445	695	151	0.104	0.105	1440	1500	7.4	WF	SPRINKLER			
5/30/2001	959	ON	1553	748	167	0.108	0.108	1547	1500	7.4	WF			6" tall broccoli	
6/4/2001	1141	ON	1379	663	140	0.102	0.100	1403	1200	7.5	WF				
6/13/2001	1000	ON	505	242	47	0.093	0.098	482	800	7.6	WF				
6/19/2001	1136	ON	503	243	51	0.101	0.102	502	1500	7.6	WF	sprinkler			
6/26/2001	1147	ON	1017	489	100	0.098	0.098	1023	1600	7.5	WF				
7/5/2001	1146	ON	978	472	101	0.103	0.104	972	1400	7.6	WF				
7/17/2001	1007	ON	518	249	56	0.108	0.106	528	1600	7.6	WF	sprinkler		18" tall Broccoli with heads developing	
7/24/2001	932	ON	1214	586	120	0.099	0.099	1212	1200	7.6	WF	sprinkler			
8/1/2001	1141	ON	549	259	51	0.093	0.091	559	1000	?	WF	sprinkler		PH Meter Broke	
8/14/2001	1111	ON	902	426	87	0.096	0.096	906	900	7.6	WF	sprinkler			
8/22/2001	1102	ON	603	284	68	0.113	0.112	608	1100	7.7	WF	sprinkler			
8/28/2001	918	ON	1365	646	147	0.108	0.107	1378	1000	7.6	WF	sprinkler			Gypsum added
9/5/2001	1229	ON	1283	605	132	0.103	0.101	1304	1400	7.5	WF				
9/18/2001	1100	ON	1550	732	168	0.108	0.107	1571	1600	7.5	WF	sprinkler			
9/26/2001	919	ON	1558	736	178	0.114	0.112	1592	1200	7.5	WF	SPRINKLER			
9/28/2001	1054	ON	559	264	66	0.118	0.116	569	1400	7.6	WF				
10/2/2001	1055	ON	1587	749	169	0.106	0.104	1623	1000	7.5	WF	SPRINKLER			
10/11/2001	1018	ON	1625	767	173	0.106	0.105	1654	1000	7.5	WF	Sprinkler			
10/23/2001	1016	ON	1583	743	161	0.102	0.102	1584	1000	7.6	WF	Sprinkler			
10/25/2001	1022	ON	1663	787	174	0.105	0.102	1704	1500	7.5	WF	Sprinkler			
11/3/2001	1108	ON	1663	783	166	0.100	0.100	1660	1600	7.6	WF	sprinkler			
2001 Average				Na	126	0.104	0.104			7.56					
2001 Stand. Dev.					48.23					0.06					
				# Values	30	0.007	0.005								
				Max	182										
				Min	47										
4/10/2002	1058	ON	1375	648	144	0.105	0.111	1302	1000	7.3	WF	Sprinkler		Na Collected	
4/15/2002	1001	ON	1477	693	160	0.108	0.108	1484	1700	7.6	WF	Sprinkler		Na Collected	
4/22/2002	1012	ON	923	435	96	0.104	0.105	918	1200	7.4	WF	Sprinkler			
4/30/2002	1026	ON	816	383	83	0.102	0.104	801	1000	7.5	WF	Sprinkler			Na Collected
5/11/2002	959	ON	684	324	61	0.089	0.092	666	1500	7.6	WF	Sprinkler			Na Collected
5/13/2002	1403	ON	1509	712	161	0.107	0.108	1494	800	7.4	WF	Sprinkler	Lettuce	1" tall lettuce	Na Collected
6/1/2002	1037	ON	836	391	92	0.110	0.116	792	700	7.5	WF	Sprinkler			Na Collected
6/3/2002	1217	ON	1540	729	169	0.110	0.114	1479	1000	7.5	WF	Sprinkler			Na Collected
6/11/2002	1109	ON	983	466	95	0.097	0.099	955	1500	7.5	WF	Sprinkler			Na Collected
6/17/2002	1118	ON	1649	812	167	0.101	0.108	1545	1400	7.6	WF	Sprinkler		8" tall lettuce medium heads	Na collected
6/26/2002	949	ON	1636	826	163	0.100	0.103	1587	500	7.5	WF	Sprinkler			Na collected
7/1/2002	1053	ON	1549	728	161	0.104	0.105	1538	1200	7.4	WF	Sprinkler	Lettuce	Harvesting	Na collected
7/9/2002	857	ON	614	287	61	0.099	0.103	592	1400	7.3	WF	Sprinkler			Na collected
8/6/2002	1126	ON	1540	721	169	0.110	0.109	1548	1200	7.3	WF	Sprinkler			Na Collected
8/14/2002	1040	ON	1380		139	0.101	0.105	1329	1300	7.3	WF	Sprinkler			Na Collected
8/20/2002	1007	ON	1557	736	157	0.101	0.105	1490	600	7.1	WF	Sprinkler			Na Collected
9/6/2002	1105	ON	799	385	75	0.094	0.092	813	1500	7.3	WF	Sprinkler			Na Collected
9/12/2002	1048	ON	550	266	59	0.107	0.109	539	1500	7.3	WF	Sprinkler			Na Collected
9/18/2002	923	ON	1583	761	175	0.111	0.112	1567	700	7.2	WF	Sprinkler			Na Collected
9/25/2002	1202	ON	1616	767	176	0.109	0.113	1564	500	7.1	WF	Sprinkler			Na Collected
10/3/2002	1309	ON	1326	644	139	0.105	0.106	1309	700	7.3	WF	Drip			Na Collected
2002 Average				Na	129	0.103	0.106			7.38					
2002 Stand. Dev.					43.09					0.15					
				# Values	21	0.006	0.006								
				Max	176										
				Min	59										
3/19/2003	1025	ON	1419	684	180	0.127	0.120	1505	1000	7.1	JC	Sprinkler			Na Collected/start of year soil sample taken
3/29/2003	1103	ON	508	242	55	0.108	0.107	514	1400	7.4	WF	Sprinkler			Na Collected
4/1/2003	1003	ON	979	472	111	0.113	0.109	1023	1400	7.3	WF	Sprinkler			Na Collected
4/15/2003	1047	ON	737	355	86	0.117	0.109	786	1300	7.5	WF	Sprinkler			Na Collected
5/5/2003	915	ON	1554	780	191	0.123	0.124	1535	1500	7.7	JC	Sprinkler			Na Collected
5/10/2003	1121	ON	786		94	0.120	0.116	809	1900	7.3	WF	Sprinkler			Na Collected
5/18/2003	1135	ON	604	290	80	0.132	0.131	609	1400	7.7	JC	Sprinkler			Na Collected
5/26/2003	1134	ON	980	471	109	0.111	0.111	980	1400	7.6	JC				
5/31/2003	1118	ON	820	402	91	0.111	0.107	851	1500	7.5	WF	Sprinkler			Na Collected
6/7/2003	1100	ON	858	421	103	0.120	0.123	840	800	7.4	WF	Sprinkler	lettuce		Na Collected
6/14/2003	1123	ON	801	393	94	0.117	0.117	805	900	7.3	WF	Sprinkler	lettuce		Na Collected
6/21/2003	1140	ON	590	290	64	0.108	0.102	629	1200	7.4	WF	Sprinkler	lettuce		Na Collected
6/28/2003	1206	ON	748	366	76	0.102	0.098	775	600	7.5	WF	Sprinkler	lettuce		Na Collected
7/5/2003	1143	ON	809	396	98	0.121	0.120	820	1900	7.4	WF	Sprinkler	lettuce		Na Collected
7/20/2003	1245	ON	505	241	66	0.131	0.121	545	1100	7.6	JC	Sprinkler	lettuce		Na Collected
8/2/2003	1142	ON	805	395	100	0.124	0.121	829	1000	7.4	WF	Sprinkler			Na Collected
8/11/2003	1000	ON	1587	760	210	0.132	0.133	1574	900	7.7	JC	Furrow			Na Collected
9/2/2003	1110	ON	1575	772	231	0.147	0.148	1560	1600	7.1	WF	Sprinkler			
9/9/2003	925	ON	1514	726	199	0.131	0.139	1430	1200	7.5	JC	Sprinkler	Lettuce		Na Collected
9/13/2003	1138	ON	1182	582	157	0.133	0.134	1172	700	7.4	WF	Sprinkler	Lettuce		Na Collected
9/27/2003	1120	ON	1289	632	158	0.123	0.122	1292	1300	7.5	WF	Sprinkler	Lettuce		Na Collected
10/13/2003	1130	ON	1637	789	193	0.118	0.122	1577	600	7.6	JC	Sprinkler	Lettuce		Na Collected
10/24/2003	943	ON	1634	801	193	0.118	0.119	1624	1500	7.9	WF		Lettuce		Na Collected
10/25/2003	1310	ON	1620	798	184	0.114	0.116	1587	1000	7.4	WF	Sprinkler	Lettuce		Na Collected
10/27/2003	847	ON	1568	755	182	0.116	0.117	1549	500	7.6	JC	Sprinkler	Lettuce		
2003 Average				Na	132	0.121	0.119			7.47					
2003 Stand. Dev.					54.59					0.18					
				# Values	25	0.010	0.012								
				Max	231										
				Min	55										
3/16/2004	1135	ON	1532	757	190	0.124	0.131	1454	1000	7.3	WF	Sprinkler	Empty		Na Collected
3/24/2004	1000	ON	1530	738	182	0.119	0.118	1536	1000	7.4	JC	Sprinkler	Empty		Na Collected
4/1/2004	1030	ON	1144	560	128	0.112	0.110	1164	1300	7.8	WF		Empty		Na Collected
4/4/2004	1105	ON	1416	682	174	0.123	0.118	1470	1500	7.5	JC	Sprinkler	Empty		Na Collected
4/10/2004	1100	ON	1288	631	151	0.117	0.115	1315	1700	7.5	WF	Sprinkler	Empty		Na Collected
4/24/2004	1037	ON	1292	627	153	0.118	0.116	1321	1400	7.6	WF	Sprinkler	Empty		Na Collected
5/8/2004	1038	ON	737	361	82	0.111	0.110	743	1200	7.6	WF	Sprinkler	Cauliflower		Na Collected
5/15/2004	1108	ON	1645	808	196	0.119	0.123	1598	1600	7.5	WF	Sprinkler	Cauliflower		Na Collected
5/22/2004	1250	ON	1019	499	118	0.116	0.112	1055	1400	7.5	WF	Sprinkler	Cauliflower		Na Collected
6/1/2004	915	ON	1511	725	189	0.125	0.125	1509	1200	7.4	JC	Sprinkler	Cauliflower		Na Collected
6/5/2004	1124	ON	570	280	69	0.121		1117?	700	7.5	WF	Sprinkler	Cauliflower		
6/13/2004	1435	ON	672	322	84	0.125		Error	1400	7.7	JC	Sprinkler	Cauliflower		
6/21/2004	947	ON	1662	797	197	0.119	0.116	1704	1800	7.6	JC	Sprinkler	Cauliflower		Na Collected
6/28/2004	1451	ON	1677	805	209	0.125	0.121	1732	500	7.6	JC	Sprinkler	Cauliflower		Na Collected
7/4/2004	1102	ON	966	464	118	0.122	0.114	1037	1600	7.5	JC	Sprinkler	Cauliflower		Na Collected
7/10/2004	1207	ON	586	287	78	0.133	0.129	607	1400	7.6	WF	Sprinkler			Na Collected
7/17/2004	1103	ON	1395	683	156	0.112	0.109	1429	1100	7.5	WF	Sprinkler			Na Collected
7/31/2004	1100	ON	1088	533	118	0.108	0.105	1128	700	7.5	WF	Sprinkler			Na Collected / Planted
8/8/2004	1128	ON	1114	535	132	0.118	0.118	1114	700	7.3	JC	Sprinkler			Na Collected

8/23/2004	1145	ON	1660	797	200	0.120	0.121	1648	2100	7.3	JC	Sprinkler	Lettuce		Na Collected
8/28/2004	1105	ON	1005	493	110	0.109	0.120	920	1400	7.6	WF	Sprinkler	Lettuce		Na Collected
10/7/2004	1124	ON	1603	786	190	0.119	0.114	1666	750	7.4	WF	Sprinkler	Lettuce		Na Collected
10/9/2004	1333	ON	621	305	69	0.111	0.109	634	1300	7.6	WF	Sprinkler	Lettuce		Na Collected
10/16/2004	1138	ON	1625	796	184	0.113	0.108	1703	700	7.4	WF	Sprinkler	Lettuce		Na Collected
2004 Average				Na	145	0.118	0.116			7.51					
2004 Stand. Dev.					46.61					0.12					
				# Values	24	0.006	0.007								
				Max	209										
				Min	69										
4/24/2005	1559	ON	1552	747	167	0.108	0.105	1590	1400	7.7	JC	Sprinkler	Empty		Na Collected
5/1/2005	1335	ON	1301	626	139	0.107	0.104	1340	1200	7.3	JC	Sprinkler	Empty		Na Collected
5/7/2005	1049	ON	1550	759	150	0.097	0.105	1435	1400	7.6	WF	Sprinkler	Empty		Na Collected
5/8/2005	1124	ON	1541	741	162	0.105	0.094	1717	1700	7.1	JC	Sprinkler	Empty		Na Collected
5/21/2005	1142	ON	677	332	65	0.096	0.106	612	1700	7.6	WF	Sprinkler	Planted		Na Collected/ Soil Sample Taken
6/11/2005	1105	ON	576	282	60	0.104	0.103	581	1100	7.7	WF	Sprinkler	Lettuce		Na Collected
6/25/2005	1226	ON	987	487	98	0.099	0.102	964	500	7.6	WF	Sprinkler	Lettuce		Na Collected
7/5/2005	1240	ON	1476	723	158	0.107	0.106	1489	1200	7.6	WF	Sprinkler	Lettuce		Na Collected
7/8/2005	928	ON	1004	492	108	0.108	0.108	1003	800	7.6	WF	Sprinkler	Lettuce		
7/12/2005	848	ON	974	468	102	0.105	0.097	1053	1700	7.5	JC	Sprinkler	Lettuce		
8/13/2005	1155	ON	935	459	90	0.096	0.098	917	1500	7.4	WF	Sprinkler			Na Collected
8/20/2005	1340	ON	1414	679	141	0.100	0.103	1372	900	7.4	JC	Drip			Na Collected
2005 Average				Na	120	0.103	0.103			7.51					
2005 Stand. Dev.					37.65					0.18					
				# Values	12	0.005	0.004								
				Max	167										
				Min	60										
5/4/2006	1021	ON	1455	713	159	0.109	0.109	1458	1600	7.3	WF	Sprinkler			Na Collected
5/12/2006	1037	ON	572	281	63	0.110	0.113	558	1000	7.4	WF	Sprinkler			Na Collected
5/13/2006	1239	ON	1105	543	128	0.116	0.118	1082	1300	7.1	WF	Sprinkler			Na Collected
6/1/2006	1058	ON	832	408	94	0.113	0.112	836	1300	7.5	WF	Sprinkler			Na Collected
6/6/2006	1025	ON	1110	535	121	0.109	0.120	1009	1500	7.4	JC	Sprinkler			
6/10/2006	1210	ON	889	437	98	0.110	0.112	872	1200	7.5	WF	Sprinkler			Na Collected
6/24/2006	1145	ON	832	406	93	0.112	0.117	797	1500	7.7	WF	Sprinkler			Na Collected
7/8/2006	1155	ON	700	344	85	0.121	0.119	716	1100	7.4	WF	Sprinkler			Na Collected
7/19/2006	1125	ON	698	342	79	0.113	0.118	667	1300	7.5	WF	Sprinkler			Na Collected
8/19/2006	1230	ON	1085	533	116	0.107	0.100	1161	700	7.3	WF	Sprinkler	Lettuce		Na Collected
9/8/2006	1130	ON	942	463	107	0.114	0.105	1022	1600	7.2	WF	Sprinkler	Lettuce		Na Collected
2006 Average				Na	104	0.112	0.113			7.39					
2006 Stand. Dev.					26.39					0.16					
				# Values	11	0.004	0.006								
				Max	159										
				Min	63										
4/19/2007	1125	ON	1637	825	161	0.098	0.097	1666	1500	7.5	JC	Sprinkler	Lettuce		Na Collected
5/9/2007	948	ON	659	322	63	0.096	0.086	732	600	7.6	JC	Sprinkler	Lettuce		Na Collected
5/12/2007	1335	ON	616	297	61	0.099	0.093	659	1000	7.5	WF	Sprinkler	Lettuce		
5/26/2007	1335	ON	559	271	60	0.107	0.094	638	1200	7.6	WF	Sprinkler			Na Collected
6/16/2007	1240	ON	764	369	81	0.106	0.106	762	1300	7.5	WF	Sprinkler			Na Collected
7/7/2007	1330	ON	591	287	71	0.120	0.125	568	1600	7.6	WF	Sprinkler	Lettuce		Na Collected
7/20/2007	1025	ON	1622	812	181	0.112	0.115	1579	800	7.5	WF	Sprinkler	Lettuce		
7/23/2007	1430	ON	653	318	77	0.118	0.135	571	900	7.6	JC	Sprinkler	Lettuce		Na Collected
7/28/2007	1125	ON	1609	848	181	0.112	0.107	1692	1000	7.4	WF	Sprinkler	Lettuce		Na Collected
8/23/2007	1105	ON	609	296	73	0.120	0.126	581	800	7.7	WF	Sprinkler	Lettuce		Harvesting
8/30/2007	848	ON	1622	812	214	0.132	0.133	1611	700	7.3	JC	Sprinkler			Na Collected
9/12/2007	1130	ON	1442	720	192	0.133	0.134	1433	500	7.45	JC	Sprinkler			Na Collected
2007 Average				Na	118	0.113	0.112			7.52					
2007 Stand. Dev.					61.35					0.11					
				# Values	12	0.012	0.018								
				Max	214										
				Min	60										
4/19/2008	1245	ON	766	374	81	0.106	0.140	579	1600	7.7	WF	Sprinkler	Lettuce		Na Collected
4/26/2008	1110	ON	960	472	106	0.110	0.108	983	1400	7.6	WF	Sprinkler	Lettuce		Na Collected
5/16/2008	1145	ON	913	448	95	0.104	0.103	922	1300	7.6	WF	Sprinkler			Na Collected
5/17/2008	1250	ON	619	301	58	0.094	0.090	641	1400	7.8	WF	Sprinkler			Na Collected
5/28/2008	1140	ON	1302	647	143	0.110	0.110	1296	1600	7.4	WF	Sprinkler			Na Collected
6/14/2008	1250	ON	852	418	81	0.095	0.145	559	1500	7.6	WF	Sprinkler			Na Collected
6/21/2008	1305	ON	1154	571	119	0.103	0.105	1136	1300		WF	Sprinkler			Na Collected
6/28/2008	1230	ON	678	331	71	0.105	0.103	687	1300	7.6	WF	Sprinkler			Na Collected
7/6/2008	1245	ON	699	302	70	0.100	0.099	709	1100	7.2	JC	Sprinkler			Na Collected
7/20/2008	1230	ON	1432	736	146	0.102	0.098	1495	1100	7	JC	Sprinkler			
7/28/2008	1310	ON	601	293	58	0.097	0.095	610	1100	7.5	JC	Sprinkler			Na Collected
8/2/2008	1135	ON	788	386	75	0.095	0.092	815	1500	7.8	WF	Sprinkler			Na Collected
8/9/2008	1140	ON	997	491	97	0.097	0.098	985	1300	7.7	WF	Sprinkler			Na Collected
10/24/2008	1400	ON	1277	634	141	0.110	0.113	1252	1100	7.6	WF	Sprinkler			Na Collected
2008 Average				Na	96	0.102	0.107			7.55					
2008 Stand. Dev.					30.94					0.23					
				# Values	14	0.006	0.016								
				Max	146										
				Min	58										
4/21/2009	1531	ON	579	281	48	0.083	0.087	552	600	7.6	JC	Drip	Strawberries		Na Collected
4/27/2009	1450	ON	1026	508	100	0.097	0.102	978	900	7.4	JC	Drip	Strawberries		Na Collected
5/19/2009	1235	ON	532	259	46	0.086	0.101	457	800	7.6	JC	Drip			Na Collected
5/25/2009	1325	ON	1534	769	160	0.104	0.107	1494	500	7.3	JC	Drip			Na Collected
6/22/2009	1440	ON	1147	565	111	0.097	0.093	1195	1000	7.2	JC	Drip			Na Collected
6/27/2009	1335	ON	1306	648	123	0.094	0.099	1245	1000	7.4	WF	Drip			Na Collected
7/14/2009	1450	ON	617	301	61	0.099	0.091	669	1200	7.7	JC	Sprinkler			
7/21/2009	1620	ON	861	423	92	0.107	0.108	855	900	7.5	JC	Drip			
7/25/2009	1240	ON	707	345	64	0.091	0.093	687	700	7.7	WF	Drip			Na Collected
8/12/2009	1255	ON	1448	721	147	0.102	0.107	1377	1100	7.5	WF	Drip			Na Collected
8/18/2009	1400	ON	1637	822	162	0.099	0.103	1577	500	7.5	JC	Drip			Na Collected
8/29/2009	1105	ON	1587	794	168	0.106	0.109	1545	700	7.5	WF	Drip			Na Collected
9/5/2009	1325	ON	1567	783	145	0.093	0.097	1502	1000	7.5	WF	Drip			Na Collected
9/12/2009	1200	ON	630	306	52	0.083	0.082	632	600	7.8	WF	Drip			Na Collected
9/19/2009	1245	ON	1668	836	163	0.098	0.102	1595	900	7.6	WF	Drip			Na Collected
9/26/2009	1300	ON	1657	830	169	0.102	0.106	1597	600	7.6	WF	Drip			Na Collected
10/3/2009	1140	ON	1696	849	167	0.098	0.102	1640	600	7.6	WF	Drip			Na Collected
2009 Average				Na	116	0.096	0.099			7.53					
2009 Stand. Dev.					47.72					0.15					
				# Values	17	0.007	0.008								
				Max	169										
				Min	46										

Site Readings Turnout#46_Test Site#3															
Date	Time	on/off	Hand held conductivity meter Micro Siemens	TDS	Sodium mg/l Actual	Na:EC Calc	Na:EC (On-Site) Calc	Site mounted conductivity meter Micro Siemens	GPM	PH	Operator Name	Irrigation Method	Crop Type	Crop Description	Comments
4/4/2001	1010	ON	1000	623	99	0.099	0.079	1246	900	7.5					
4/6/2001	1050	ON	1568	756	157	0.100	0.108	1450	900	7.1					
5/4/2001	1255	ON	1327	641	139	0.105	0.107	1298	1100	7.2	WF	Sprinkler		15" tall Brocolli	
5/22/2001	947	ON	1579	761	163	0.103	0.104	1571	1200	7.1	WF				
6/5/2001	1403	ON	1536	736	159	0.104	0.108	1470	1200	7.3	WF				
6/13/2001	856	ON	1390	671	144	0.104	0.104	1388	1000	7.1	WF	sprinkler			
6/20/2001	1036	ON	1216	585	126	0.104	0.105	1202	1100	7.1	WF				
6/26/2001	1312	ON	1334	641	132	0.099	0.101	1310	800	7.3	WF	sprinkler			
7/5/2001	1050	ON	1734	835	186	0.107	0.109	1707	1200	7.2	WF	sprinkler			
7/17/2001	902	ON	1534	737	158	0.103	0.103	1530	1300	7.3	WF	sprinkler		11/2" tall seedlings	
7/25/2001	1055	ON	1319	635	136	0.103	0.104	1306	1100	7.3	WF	sprinkler			
8/1/2001	1039	ON	1421	668	146	0.103	0.102	1434	1200	7.3	WF				
8/25/2001	821	ON	1653	778	177	0.107	0.106	1677	1300	7.3	WF	Sprinkler			
8/28/2001	848	ON	1601	755	172	0.107	0.107	1612	1000	7.3	WF	Sprinkler			
9/5/2001	1314	ON	1596	753	164	0.103	0.102	1612	1200	7.3	WF	Sprinkler			
9/21/2001	854	ON	1667	785	178	0.107	0.106	1685	800	7.5	WF	Sprinkler			
10/18/2001	1148	ON	1629	766	170	0.104	0.103	1652	800	7.4	WF	Sprinkler			
11/1/2001	1212	ON	1605	761	168	0.105	0.101	1657	1300	7.5	WF	sprinkler			
2001 Average				Na	154	0.104	0.103			7.28					
2001 Stand. Dev.					21.88					0.13					
				# Value	18	0.003	0.006								
				Max	186										
				Min	99										
4/1/2002	1252	ON	1496	707	150	0.100	0.109	1379	500	7.3	WF	DRIP	strawberry		Na Collected/meter reset
4/8/2002	1258	ON	1480	705	156	0.105	0.107	1457	500	7.3	WF	DRIP			
4/15/2002	1142	ON	1466	690	158	0.108	0.111	1423	1000	7.3	WF	DRIP			Na collected
4/22/2002	1138	ON	1501	704	162	0.108	0.096	1684	800	7.2	WF	Sprinkler			
4/29/2002	950	ON	1528	717	161	0.105	0.106	1516	1000	7.3	WF	Sprinkler			Na Collected
5/15/2002	857	ON	1643	833	169	0.103	0.091	1860	800	7.3	WF	Sprinkler			Na Collected
6/1/2002	819	ON	1545	735	171	0.111	0.107	1595	1000	7.6	WF	Drip			Na Collected
6/11/2002	1012	ON	1624	757	165	0.102	0.102	1615	800	7.3	WF	Drip			Na Collected
7/1/2002	958	ON	1625	765	164	0.101	0.099	1656	1000	7.3	WF	Drip			Na Collected
7/9/2002	1144	ON	1424	667	149	0.105	0.103	1453	800	7.4	WF	Sprinkler			Na Collected
7/20/2002	1026	ON	1430	669	163	0.114	0.113	1439	1000	7.5	WF	Sprinkler			Na Collected
7/23/2002	1139	ON	1511	708	166	0.110	0.107	1557	700	7.3	WF	Sprinkler			Na Collected
7/31/2002	1246	ON	1503	695	156	0.104	0.105	1479	1000	7.4	WF	Drip			Na Collected
8/7/2002	1000	ON	1563	740	173	0.111	0.107	1615	800	7.2	WF	Drip			Na Collected
8/15/2002	1014	ON	1128	534	112	0.099	0.100	1115	500	7.4	WF	Sprinkler			Na Collected, Soil sample collected
9/12/2002	1011	ON	738	354	79	0.107	0.110	721	800	7.3	WF	Drip			Na Collected
2002 Average				Na	153	0.106	0.105			7.34					
2002 Stand. Dev.					24.33					0.10					
				# Value	16	0.004	0.006								
				Max	173										
				Min	79										
3/19/2003	940	ON	1423	685	183	0.129	0.124	1477	800	7.3	JC	Drip			Na Collected
3/28/2003	1337	ON	1417	685	172	0.121	0.119	1447	800	7.5	WF	Drip			
4/9/2003	1345	ON	1489	717	183	0.123	0.122	1496	800	7.7	JC	Drip			Na Collected
4/21/2003	1036	ON			173		0.122	1414	700		WF	Sprinkler			Na Collected
5/13/2003	1015	ON	1473		174	0.118	0.121	1443	1000	7.3	WF	Sprinkler	Lettuce		Na Collected
5/18/2003	1030	ON	1189	573	155	0.130	0.130	1191	600	7.7	JC	Sprinkler	Lettuce		Na Collected
5/31/2003	1312	ON	1613	792	192	0.119	0.119	1609	900	7.7	WF	Drip	Lettuce		Na Collected
6/7/2003	1337	ON	1068	525	134	0.125	0.124	1080	700	7.7	WF	Sprinkler	Lettuce		Na Collected
6/21/2003	1028	ON	1060	519	134	0.126	0.126	1067	1500	7.7	WF	Sprinkler	Lettuce		Na Collected
6/26/2003	1309	ON	1457	716	180	0.124	0.124	1453	1000	7.5	WF	Drip	Lettuce		Na Collected
6/28/2003	1019	ON	1581	776	188	0.119		No Power	1000	7.5	WF	Sprinkler	Lettuce		Na Collected
7/6/2003	1050	ON	1561	721	203	0.130		No Power	700	7.6	JC	Sprinkler	Lettuce		Na Collected
7/12/2003	1003	ON	1661	815	199	0.120		No Power	1000	7.6	WF	Drip	Lettuce		Na Collected
7/21/2003	1400	ON	1575	757	208	0.132		No Power	1000	7.5	JC	Sprinkler			Na Collected
8/1/2003	845	ON	1609	788	212	0.132		No Power	700	7.5	WF	Sprinkler	Lettuce		Na Collected
8/2/2003	1107	ON	1631	800	202	0.124		No Power	1000	7.4	WF	Sprinkler	Lettuce		Na Collected
8/11/2003	1110	ON	1313	631	174	0.133		No Power	700	7.6	JC	Sprinkler	Lettuce		Na Collected
9/9/2003	1500	ON	1597	767	214	0.134	0.134	1593	1100	7.5	JC	Sprinkler	Lettuce		Na Collected
9/27/2003	950	ON	1498	733	194	0.130	0.127	1533	1000	7.5	WF	Drip			Na Collected
10/20/2003	824	ON	1635	788	197	0.120	0.121	1631	1100	7.5	JC	Drip			Na Collected
2003 Average				Na	184	0.126	0.124			7.54					
2003 Stand. Dev.					22.76					0.13					
				# Value	20	0.005	0.004								
				Max	214										
				Min	134										
3/18/2004	1052	ON	1410	690	175	0.124	0.120	1457	1000	7.4	WF	Sprinkler	Empty		
4/5/2004	905	ON	1506	726	181	0.120	0.115	1571	1200	7.5	JC	Sprinkler	Empty		
4/7/2004	1157	ON	1553	760	183	0.118	0.116	1581	800	7.5	WF	Sprinkler	Empty		Na Collected
4/13/2004	1020	ON	1554	761	182	0.117	0.115	1588	1400	7.5	WF	Sprinkler	Empty		Na Collected
4/26/2004	1040	ON	1557	748	193	0.124	0.123	1574	1200	7.4	JC	Sprinkler	Cauliflower		Na Collected
5/1/2004	1148	ON	1362	668	167	0.123	0.120	1388	1000	7.3	WF	Sprinkler	Cauliflower		Na Collected
5/13/2004	1110	ON	1652	809	195	0.118	0.116	1686	1200	7.6	WF	Sprinkler	Cauliflower		
5/17/2004	1310	ON	1598	767	197	0.123	0.118	1676	1400	7.4	JC	Sprinkler	Cauliflower		Na Collected
5/22/2004	943	ON	1650	809	204	0.124	0.121	1690	900	7.5	WF	Sprinkler	Cauliflower		Na Collected
5/30/2004	1350	ON	1614	775	205	0.127	0.124	1659	800	7.6	JC	Sprinkler	Cauliflower		Na Collected
6/12/2004	1007	ON	1771	867	212	0.120	0.117	1808	1300	7.7	WF	Sprinkler	Cauliflower		Na Collected
6/22/2004	904	ON	1686	828	199	0.118	0.116	1722	700	7.8	WF	Sprinkler	Cauliflower		Na Collected
7/10/2004	1047	ON	943	463	112	0.119	0.115	977	700	7.4	WF	Sprinkler			Na Collected
8/7/2004	950	ON	1530	749	179	0.117	0.113	1579	700	7.4	WF	Sprinkler	Lettuce		Na Collected
8/17/2004	1045	ON	1658	796	204	0.123	0.123	1654	800	7.4	JC	Sprinkler	Lettuce		Na Collected
8/28/2004	945	ON	1643	804	207	0.126	0.123	1689	1400	7.4	WF	Sprinkler	Lettuce		Na Collected
2004 Average				Na	187	0.121	0.118			7.49					
2004 Stand. Dev.					23.92					0.13					
				# Value	16	0.003	0.004								
				Max	212										
				Min	112										
5/27/2005	1007	ON	1559	765	182	0.117	0.112	1618	1100	7.4	WF	Sprinkler	Lettuce		Na Collected
5/28/2005	1055	ON	1578	774	179	0.113	0.111	1616	1100	7.5	WF	Sprinkler	Lettuce		
6/5/2005	1434	ON	1632	703	195	0.119	0.117	1667	1100	7.7	JC	Sprinkler	Lettuce		Na Collected
6/19/2005	1107	ON	1545	757	165	0.107	0.103	1600	1200	7.5	WF	Sprinkler	Lettuce		Na Collected
6/29/2005	1526	ON	1313	630	144	0.110	0.107	1347	1100	7.5	JC	Sprinkler			
7/2/2005	1437	ON	879	422	94	0.107	0.103	910	1000	7.3	JC	Sprinkler			Na Collected
7/8/2005	1220	ON	1513	741	173	0.114	0.110	1573	1500	7.4	WF	Sprinkler			Na Collected
7/11/2005	1340	ON	1545	743	174	0.113	0.109	1603	1300	7.3	JC	Sprinkler			
7/16/2005	1033	ON	968	475	104	0.107	0.103	1014	1000	7.4	WF	Sprinkler			Na Collected
7/23/2005	1026	ON	1362	671	144	0.106	0.105	1372	1500	7.5	WF	Sprinkler	Broccoli		Na Collected
7/30/2005	1044	ON	1614	792	177	0.110	0.105	1686	1500	7.4	WF	Sprinkler	Broccoli		Na Collected
8/7/2005	1100	ON	1390	668	155	0.112	0.113	1371	500	7.2	JC	Drip	Broccoli		Na Collected
8/27/2005	1030	ON	1528	750	172	0.113	0.112	1539	1000	7.4	WF	Sprinkler	Broccoli		Na Collected

2005 Average				Na	158	0.111	0.108			7.42					
2005 Stand. Dev.					30.12					0.12					
				# Value	13	0.004	0.005								
				Max	195										
				Min	94										
5/5/2006	942	ON	1475	725	162	0.110	0.108	1495	1400	7.5	WF	Sprinkler			Na Collected
5/18/2006	1136	ON	1457	715	177	0.121	0.121	1462	1000	7.4	WF	Sprinkler	Lettuce		Na Collected
6/6/2006	905	ON	1377	677	152	0.110	0.111	1375	1400	7.3	JC	Sprinkler	Lettuce		Na Collected
6/10/2006	1050	ON	1488	729	182	0.122	0.121	1509	900	7.1	WF	Sprinkler	Lettuce		Na Collected
6/17/2006	1030	ON	1276	628	138	0.108	0.107	1291	900	7.5	WF	Sprinkler	Lettuce		Na Collected
6/25/2006	1045	ON	1572	747	170	0.108	0.111	1527	1200	7.3	JC	Sprinkler	Lettuce		Na Collected
7/1/2006	1010	ON	1499	734	172	0.115	0.114	1508	1300	7.5	WF	Sprinkler	Lettuce		Na Collected
7/22/2006	1030	ON	1543	756	185	0.120	0.121	1532	900	7.3	WF	Sprinkler			Na Collected
8/19/2006	1345	ON	1603	783	164	0.102	0.102	1615	1500	7.3	WF	Sprinkler			Na Collected
8/26/2006	1020	ON	1376	673	155	0.113	0.112	1386	900	6.8	WF	Sprinkler			Na Collected
9/12/2006	1050	ON	1417	681	156	0.110	0.110	1414	1400	7.1	WF	Sprinkler	Lettuce		Na Collected
2006 Average				Na	165	0.113	0.112			7.28					
2006 Stand. Dev.					14.13					0.21					
				# Value	11	0.006	0.006								
				Max	185										
				Min	138										
4/8/2007	1035	ON	1490	719	173	0.116	0.113	1527	1100	7.2	WF	Sprinkler			Na Collected
4/27/2007	1315	ON	1572	757	167	0.106	0.104	1609	1100	7.4	WF	Sprinkler			Na Collected
4/28/2007	1130	ON	1218	589	138	0.113	0.108	1279	900	7.5	WF	Sprinkler			Na Collected
5/19/2007	1115	ON	1590	795	173	0.109	0.106	1628	1500	7.4	WF	Sprinkler			Na Collected
5/26/2007	1105	ON	1679	841	181	0.108	0.107	1685	1500	7.3	WF	Sprinkler	Califlower		Na Collected
6/7/2007	1000	ON	1669	836	172	0.103	0.101	1698	750	7.5	WF	Sprinkler	Califlower		Na Collected
6/9/2007	1130	ON	1382	687	145	0.105	0.101	1430	1000	7.4	WF	Sprinkler	Califlower		Na Collected
6/23/2007	1035	ON	1430	696	168	0.117	0.111	1507	1100	7.5	WF	Sprinkler	Califlower		Na Collected
7/7/2007	1120	ON	1254	622	144	0.115	0.112	1287	1100	7.4	WF	Sprinkler	Califlower		Na Collected
7/20/2007	900	ON	1628	815	179	0.110	0.109	1648	1100	7.3	WF	Sprinkler			Na Collected
7/21/2007	1430	ON	996	491	104	0.104	0.102	1016	1500	7.5	WF	Sprinkler			
7/28/2007	1000	ON	1658	831	195	0.118	0.116	1686	1200	7.2	WF	Sprinkler			Na Collected
8/4/2007	1100	ON	1576	788	171	0.109	0.108	1579	1200	7.3	WF	Sprinkler			Na Collected
8/11/2007	1120	ON	1721	863	198	0.115	0.112	1762	1300	7.4	WF	Sprinkler			Na Collected
9/27/2007	915	ON	1436	732	155	0.108	0.103	1510	1300	7.3	JC	Sprinkler	Lettuce		Na Collected
10/3/2007	1120	ON	1629	818	178	0.109	0.108	1653	600	7.3	JC	Sprinkler	Lettuce		Na Collected
10/23/2007	1425	ON	1553	776	175	0.113	0.109	1600	1300	7.5	WF	Sprinkler			Na Collected
2007 Average				Na	166	0.110	0.108			7.38					
2007 Stand. Dev.					22.80					0.10					
				# Value	17	0.005	0.004								
				Max	198										
				Min	104										
3/26/2008	1105	ON	1447	726	157	0.109	0.104	1509	1000		JC	Sprinkler			Na Collected
4/10/2008	1025	ON	1359	676	147	0.108	0.104	1416	1000	7.3	WF	Sprinkler			Na Collected
4/15/2008	1015	ON	1302	651	143	0.110	0.107	1338	1000	7.1	JC	Sprinkler			Na Collected
5/3/2008	1100	ON	1493	745	162	0.109	0.104	1558	700	7.3	WF	Sprinkler	Lettuce		Na Collected
5/10/2008	1120	ON	1473	735	160	0.109	0.106	1506	1100	7.3	WF	Sprinkler	Lettuce		Na Collected
5/22/2008	1250	ON	1335	663	145	0.109	0.106	1372	1200	7.2	WF	Sprinkler	Lettuce		Na Collected
5/28/2008	955	ON	1530	764	161	0.105	0.103	1556	700	7.3	WF	Sprinkler	Lettuce		Na Collected
6/5/2008	1020	ON	1625	817	173	0.106	0.102	1698	800	7.5	WF	Sprinkler	Lettuce		Na Collected
6/7/2008	1040	ON	1502	748	159	0.106	0.100	1594	1300	7.3	WF	Sprinkler	Lettuce		Na Collected
6/18/2008	1035	ON	1584	792	170	0.107	0.102	1667	600	7.4	WF	Sprinkler	Lettuce		Na Collected
6/27/2008	1045	ON	1562	780	171	0.109	0.111	1539	1200	7.5	WF	Sprinkler	Lettuce		Na Collected
7/8/2008	1015	ON	1241	616	134	0.108	0.103	1305	800	7	JC	Sprinkler			Na Collected
7/16/2008	950	ON	1443	719	153	0.106	0.102	1498	1200	7.4	WF	Sprinkler			Na Collected
8/2/2008	1030	ON	1619	810	176	0.109		Too Wet			WF	Sprinkler			Na Collected
2008 Average				Na	158	0.108	0.104			7.30					
2008 Stand. Dev.					12.43					0.15					
				# Value	14	0.001	0.003								
				Max	176										
				Min	134										
4/23/2009	1245	ON	1559	783	165	0.106	0.110	1498	1200	7.1	JC	Sprinkler			Na Collected
4/26/2009	1245	ON	1552	792	167	0.108	0.106	1578	1200	7	JC	Sprinkler			Na Collected
5/16/2009	1355	ON	1005	495	98	0.098	0.098	998	500	7.5	WF	Furrow			Na Collected
6/17/2009	1035	ON	1504	751	148	0.098	0.100	1477	1300	7.2	WF	Sprinkler			Na Collected
7/4/2009	1030	ON	1586	793	172	0.108	0.112	1542	800	7.2	WF	Sprinkler			Na Collected
7/25/2009	1045	ON	1614	808	169	0.105	0.108	1566	800	7.5	WF	Sprinkler			Na Collected
8/8/2009	1040	ON	1566	783	159	0.102	0.104	1528	800	7.2	WF	Sprinkler			Na Collected
8/15/2009	1025	ON	1617	808	160	0.099	0.102	1574	1000	7.3	WF	Sprinkler			Na Collected
9/2/2009	1005	ON	1610	808	155	0.096	0.097	1592	1200	7.5	JC	Sprinkler			Na Collected
10/3/2009	1055	ON	1685	844	167	0.099	0.103	1625	800	7.5	WF	Sprinkler			Na Collected
2009 Average				Na	156	0.102	0.104			7.30					
2009 Stand. Dev.					21.61					0.19					
				# Value	10	0.004	0.005								
				Max	172										
				Min	98										

Site Readings
Turnout#267_Test Site#4

Date	Time	on/off	Hand held conductivity meter Micro Siemens	TDS	Sodium mg/l Actual	Na:EC Calc	Na:EC (On-Site) Calc	Site mounted conductivity meter Micro Siemens	GPM	PH	Operator Name	Irrigation Method	Crop Type	Crop Description	Comments
4/19/2001	1036	ON	1598	770	166	0.104	0.098	1687	1300	7.1		sprinkler	artichokes		
4/24/2001	1011	ON	1506	727	156	0.104	0.108	1439	1300	7.1	WF				
7/10/2001	1333	ON	507	243	44	0.087	0.083	533	1200	7.2	WF				
8/17/2001	1012	ON	976	461	99	0.101	0.115	860	1500	7.5	WF	Sprinkler			meter reset
8/29/2001	1012	ON	540	254	53	0.098	0.095	555	1500	7.5	WF	Sprinkler			
9/15/2001	1101	ON	843	396	94	0.112	0.109	863	1300	7.5	WF	Sprinkler			
2001 Average				Na	102	0.101	0.101			7.32					
2001 Stand. Dev.					50.70					0.20					
				# Values	6	0.008	0.012								
				Max	166										
				Min	44										
5/4/2002	934	ON	1038	484	103	0.099	0.082	1263	1400	7.4	WF	Sprinkler			Na Collected
5/6/2002	1021	ON	511	240	42	0.082	0.109	387	1400	7.3	WF				Na Collected
6/2/2002				231.101	50		0.104	481.46							
6/7/2002	1047	OFF		222.6	50		0.108	463.75			WF				
6/8/2002	1010	OFF		218.333	50		0.110	454.86			WF				
6/9/2002				224.093	50		0.107	466.86							
6/10/2002				217.075	50		0.111	452.24							
6/12/2002	1130	OFF		230.99	50		0.104	481.23			WF				TDS based on Conductivity *.49
6/14/2002	1000	OFF		505.277	89		0.085	1052.66			WF				TDS based on Conductivity *.51
6/15/2002				352.594	50		0.068	734.57							TDS based on Conductivity *.52
6/16/2002				321.182	50		0.075	669.13							TDS based on Conductivity *.53
6/17/2002	1144	OFF		581.65	107		0.088	1211.77			WF				TDS based on Conductivity *.54
6/18/2002	1128	OFF		455.002	71		0.075	947.92			WF				TDS based on Conductivity *.55
6/19/2002				300.01	50		0.080	625.02							TDS based on Conductivity *.56
6/20/2002				324.024	50		0.074	675.05							TDS based on Conductivity *.57
6/21/2002				335.616	50		0.072	699.2							TDS based on Conductivity *.58
6/22/2002				461.909	77		0.080	962.31							TDS based on Conductivity *.59
6/23/2002				467.342	77		0.079	973.63							TDS based on Conductivity *.60
6/24/2002	1038	OFF		642.259	120		0.090	1338.04			WF				TDS based on Conductivity *.61
6/25/2002	1411	OFF		582.634	107		0.088	1213.82			WF				TDS based on Conductivity *.62
6/27/2002	847	OFF		327.024	50		0.073	681.3			WF				TDS based on Conductivity *.64
6/28/2002	927	OFF		325.042	50		0.074	677.17			WF				TDS based on Conductivity *.65
6/29/2002	1024	OFF		316.301	50		0.076	658.96			WF				TDS based on Conductivity *.66
7/13/2002	1312	ON	569	268	50	0.088	0.083	599.72	1500	7.4	WF	Sprinkler			Na collected
2002 Average				Na	64	0.090	0.087			7.37					
2002 Stand. Dev.					23.58					0.06					
				# Values	24	0.009	0.014								
				Max	120										
				Min	42										
3/12/2003	850	ON	1410	680	176	0.125	0.143	1231	1500	7.4	JC	Sprinkler	Artichokes		Na Collected
3/25/2003	1422	ON	719	346	82	0.114	0.127	646	1200	7.7	JC	Sprinkler	Artichokes		Na Collected
6/22/2003	1449	ON	584	281	66	0.113	0.118	561	1400	7.3	JC	Sprinkler	Artichokes		Na Collected
8/16/2003	1342	ON	827	405	112	0.135	0.141	795	1500	7.6	WF	Sprinkler	Artichokes		Na Collected
9/27/2003	1154	ON	1624	797	211	0.130		Too Wet	?	7.8	WF	Sprinkler	Artichokes		Na Collected
2003 Average				Na	129	0.123	0.132			7.56					
2003 Stand. Dev.					62.05					0.21					
				# Values	5	0.010	0.012								
				Max	211										
				Min	66										
3/21/2004	1140	ON	846	407	93	0.110	0.133	697	1500	7.6	JC	Sprinkler	Artichokes		
4/1/2004	1052	ON	1379	644	158	0.115		Too Wet	Same		WF		Artichokes		
4/3/2004	1130	ON	885	435	105	0.119	0.133	790	1500	7.7	WF	Sprinkler	Artichokes		Na Collected
4/27/2004	1115	ON	1024	503	120	0.117	0.108	1110	1400	7.6	WF	Sprinkler	Artichokes		Na Collected
7/31/2004	1142	ON	635	311	64	0.101	0.097	660	1400	7.6	WF	Sprinkler	Artichokes		Na Collected
2004 Average				Na	108	0.112	0.118			7.63					
2004 Stand. Dev.					34.69					0.05					
				# Values	5	0.007	0.018								
				Max	158										
				Min	64										
4/23/2005	1357	ON	1600	783	168	0.105	0.104	1613	1500	7.4	WF	Sprinkler	Artichokes		Na Collected
6/11/2005	1123	ON	1070	526	114	0.107	0.103	1104	1400	7.5	WF	Sprinkler	Artichokes		Na Collected
6/18/2005	1320	ON	1184	579	131	0.111		too wet		7.8	WF	Sprinkler	Artichokes		Na Collected
7/10/2005	1200	ON	586	282	65	0.111	0.113	575	1500	7.4	JC	Sprinkler	Artichokes		Na Collected
7/23/2005	1248	ON	582	285	58	0.100		Too Wet		8	WF		Artichokes		Na Collected
8/6/2005	1150	ON	510	250	48	0.094	0.096	499	1500	7.3	WF	Sprinkler	Artichokes		Na Collected
2005 Average				Na	97	0.104	0.104			7.57					
2005 Stand. Dev.					47.81					0.27					
				# Values	6	0.007	0.007								
				Max	168										
				Min	48										
6/10/2006	1310	ON	876	430	99	0.113	0.107	924	1500	7.3	WF	Sprinkler	Artichokes		Na Collected
6/17/2006	1242	ON	601	294	66	0.110	0.110	601	1500	7.7	WF	Sprinkler	Artichokes		Na Collected
8/13/2006	1335	ON	1575	772	166	0.105	0.102	1622	1200	7.3	JC	Sprinkler	Artichokes		Na Collected
8/19/2006	1200	ON	834	409	87	0.104	0.105	832	1400	7.6	WF	Sprinkler	Artichokes		Na Collected
9/2/2006	1230	ON	1160	567	131	0.113		Too Wet	?	7.6	WF	Sprinkler	Artichokes		Na Collected
2006 Average				Na	110	0.109	0.106			7.50					
2006 Stand. Dev.					39.25					0.19					
				# Values	5	0.004	0.003								
				Max	166										
				Min	66										
4/13/2007	1130	ON	1302	628	135	0.104	0.104	1298	1400	7.6	WF	Sprinkler	Artichokes		Na Collected
6/16/2007	1250	ON	564	270	58	0.103	0.098	594	1500	7.3	WF	Sprinkler	Artichokes		Na Collected
7/7/2007	1355	ON	528	256	56	0.106		Too Wet		7.9	WF	Sprinkler	Artichokes		Na Collected
8/4/2007	1320	ON	560	272	63	0.113	0.118	536	1400	7.5	WF	Sprinkler	Artichokes		Na Collected
8/11/2007	1350	ON	740	361	81	0.109	0.114	710	1200	7.4	WF	Sprinkler	Artichokes		Na Collected
10/6/2007	1405	ON	1667	835	181	0.109	0.114	1592	1350	7.4	WF	Sprinkler	Artichokes		Na Collected
10/20/2007	1415	ON	1626	814	180	0.111	0.115	1560	1000	7.5	WF	Sprinkler	Artichokes		Na Collected
2007 Average				Na	108	0.108	0.110			7.51					
2007 Stand. Dev.					56.57					0.20					
				# Values	7	0.004	0.008								
				Max	181										
				Min	56										
3/12/2008	1310	ON	1184	576	109	0.092		NA	1000	7.6	JC	Sprinkler	Artichokes		
3/19/2008	1430	ON	1477	741	148	0.100	0.103	1441	1100	7.2	JC	Sprinkler	Artichokes		Na Collected
3/24/2008	1455	ON	1452	724	152	0.105	0.105	1441	1500	7.4	JC	Sprinkler	Artichokes		Na Collected
4/1/2008	1055	ON	846	417	88	0.104	0.109	805	1200	7.2	JC	Sprinkler	Artichokes		Na Collected
4/5/2008	1340	ON	684	333	79	0.115	0.116	679	1500	7.8	WF	Sprinkler	Artichokes		Na Collected
4/14/2008	1120	ON	520	252	52	0.100	0.089	582	1300	7.7	WF	Sprinkler	Artichokes		Na Collected
4/20/2008	1325	ON	768	377	78	0.102	0.111	702	1500	7.2	JC	Sprinkler	Artichokes		Na Collected
4/26/2008	1340	ON	503	243	52	0.103	0.110	472	1200	7.5	WF	Sprinkler	Artichokes		Na Collected
5/3/2008	1315	ON	503	243	47	0.093	0.093	506	1400	7.8	WF	Sprinkler	Artichokes		Na Collected
6/14/2008	1305	ON	541	262	50	0.092	0.089	559	1500	7.6	WF	Sprinkler	Artichokes		Na Collected
6/28/2008	1335	ON	505	244	46	0.091	0.091	505	800	7.5	WF	Sprinkler	Artichokes		Na Collected
8/2/2008	1245	ON	806	395	81	0.100		Too Wet			WF	Sprinkler	Artichokes		Na Collected
8/9/2008	1240	ON	507	246	48	0.095	0.096	501	1200	7.6	WF	Sprinkler	Artichokes		Na Collected
2008 Average				Na	79	0.100	0.101			7.51					
2008 Stand. Dev.					37.02					0.22					
				# Values	13	0.007	0.010								
				Max	152										

				Min	46										
4/15/2009	1340	ON	942	466	102	0.108	0.111	922	1500	7.4	JC	Sprinkler			Na Collected
4/22/2009	1440	ON	586	286	55	0.094	0.101	546	1200	7	JC	Sprinkler			Na Collected
4/27/2009	1435	ON	984	487	95	0.097	0.090	1052	1500	7.3	JC	Sprinkler			Na Collected
7/4/2009	1300	ON	544	264	47	0.086	0.089	529	1400	7.4	WF	Sprinkler			Na Collected
8/15/2009	1235	ON	1513	755	151	0.100	0.104	1452	1200	7.3	WF	Sprinkler			Na Collected
9/12/2009	1235	ON	636	309	52	0.082	0.083	624	1400	7.6	WF	Sprinkler			Na Collected
10/6/2009	1400	ON	1642	822	173	0.105	0.109	1588	1500	7.3	JC	Sprinkler			Na Collected
10/9/2009	1035	ON	1680	842	168	0.100				7.6	WF	Sprinkler			Na Collected
10/10/2009	1225	ON	1630	816	168	0.103				7.5	WF	Sprinkler			Na Collected
2009 Average				Na	112	0.097	0.098			7.38					
2009 Stand. Dev.					53.59					0.19					
				# Values	9	0.009	0.011								
				Max	173										
				Min	47										

B.3: Water Quality Data Sample Calculations

B.3 SAMPLE CALCULATION FOR BLENDED WATER

BLENDED WATER (i.e. ESTIMATED TEST WATER)

Na^+ IN 2009

RECYCLED WATER ANNUAL AVERAGE = 7.22 meq Na^+/L

WELL WATER ANNUAL AVERAGE = 2.61 meq Na^+/L

RECYCLED WATER USAGE = 58%

WELL WATER USAGE = 42%

BLENDED WATER Na^+ IN 2009

= 7.22(0.58) + 2.61(0.42)

= 5.28 meq Na^+/L

B.3 CONVERSION FROM mg/L TO meq/L

TEST SITE 1; 2009

ANNUAL AVERAGE $= \frac{116 \text{ mg } Na^+}{L}$

Na^+ MW = 22.99 g/mol

$$\frac{116 \text{ mg}}{L} \times \frac{1 \text{ g}}{1{,}000 \text{ mg}} \times \frac{\text{mol}}{22.99 \text{ g}} \times \frac{1 \text{ eq } Na^+}{\text{mol}} \times \frac{1{,}000 \text{ meq}}{1 \text{ eq}}$$

$$= \frac{5.04 \text{ meq } Na^+}{L}$$

RECYCLED WATER SAMPLE CALCULATIONS

EXAMPLE SAR CALCULATION

$$SAR = \frac{[Na^+]}{\sqrt{\frac{[Ca^{2+}] + [Mg^{2+}]}{2}}} \qquad [\;] = meq/L$$

2009 AVERAGE ANNUAL FROM TREATMENT PLANT

$Na^+ = 7.22 = meq/L$ $Ca^{2+} = 2.66\ meq/L$ $Mg^{2+} = 1.37\ meq/L$

$$SAR = \frac{7.22}{\sqrt{\frac{2.66 + 1.37}{2}}} = \underline{5.09}$$

EXAMPLE ESP CALCULATION

$$ESP = \frac{100 \times [(SAR \times 0.01475) - 0.0126]}{1 + [(SAR \times 0.01475) - 0.0126}$$

SAR = 5.09 (from above)

$$ESP = \frac{100 \times [(5.09 \times 0.01475) - 0.0126]}{1 + [(5.09 \times 0.01475) - 0.0126]} = \underline{5.88\%}$$

Appendix C: Soil Salinity Data

C.1: Soil Salinity Data at the Control Sites

Valley Tech
AGRICULTURAL LABORATORY SERVICES

2120 South 'K' Street
Tulare, California 93274
Office: 559-688-5684
Fax: 559-688-5768

SOIL ANALYSIS

Client: M.R.W.P.C.A.
#5 HARRIS COURT
MONTEREY, CALIFORNIA 93946

Lab No.: 04-17S209
Sampled Date: 04-13-00
Submitted Date: 04-17-00
Report Date: 04-20-00
Submitted By: JEFF PARKER

Material: SOIL -
RANCH: WILDER RANCH - CONTROL SITE 1

	%			------------meq/L	-------------					Tons/Acre		----------PPM	----------							
DESCRIPTION	SP	pH	EC dS/m	Ca	Mg	Na	K	Cl	ESP	GYP - REQ or Presence	LIME	B	NO_3N	PO_4P	K AA	Zn	Mn	Fe	Cu	SO_4S
1. BIK 4 0-12"	61	6.8	1.04	<u>4.6</u>	3.1	2.3	0.4	1.5	<1.0		-	0.2								
2. 12-24"	54	6.7	1.14	<u>5.3</u>	3.5	2.3	0.3	1.4	<1.0		-	0.2								
3. 24-36"	57	7.4	1.03	<u>4.3</u>	3.4	2.4	0.1	1.6	<1.0		+++	0.1								
OPTIMUM RANGES		6.0-7.5	<4.00 >0.60	(Ca > Mg + Na)			>0.4	<10	<5			>0.2 <1.5		>12.0	>150	>2.0	>5.0	>8.0	>1.0	>2[illegible]

RED = LOW BLUE = HIGH <u>DOMINANT SOLUBLE SALT IS UNDERLINED</u>. SEE ENCLOSED INTERPRETATION GUIDES.

IF YOU SHOULD HAVE ANY QUESTIONS, PLEASE CALL.

SAM MODESITT - CHEMIST

Valley Tech
AGRICULTURAL LABORATORY SERVICES

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Office: 559-688-5684
Fax: 559-688-5768

SOIL ANALYSIS

Client: M.R.W.P.C.A.
#5 HARRIS COURT
MONTEREY, CALIFORNIA 93946

Lab No.: 04-17S209
Sampled Date: 04-13-00
Submitted Date: 04-17-00
Report Date: 06-12-00
Submitted By: J. PARKER

Material: SOIL

RANCH: WILDER RANCH - CONTROL SITE 1

Sample Description		-PPM- NO_3N
1. Blk 4	0-12"	12.3
2.	12-24"	16.7
3.	24-36"	19.0

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AGRICULTURAL LABORATORY SERVICES

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Fax: 559 - 688-5768

SOIL ANALYSIS

Client: M.R.W.P.C.A.
#5 HARRIS COURT
MONTEREY, CALIFORNIA 93946

Lab No.: 08-10S142 PO #016025
Sampled Date: 08-08-00
Submitted Date: 08-10-00
Report Date: 08-17-00
Submitted By: JEFF PARKER

Material: SOIL -
RANCH: WILDER RANCH - CONTROL SITE #1

DESCRIPTION	% SP	pH	EC dS/m	Ca (meq/L)	Mg (meq/L)	Na (meq/L)	K (meq/L)	Cl (meq/L)	ESP	GYP (Tons/Acre, REQ or Presence)	LIME (Tons/Acre, REQ or Presence)	B (PPM)	NO_3N (PPM)	PO_4P (PPM)	K AA (PPM)	Zn (PPM)	Mn (PPM)	Fe (PPM)	Cu (PPM)	SO_4S (PPM)
1. Blk 4 12"	48	6.2	0.65	<u>2.8</u>	1.9	1.6	0.2	0.7	<1.0		-	0.2	17.2							29
2. 24"	57	6.0	0.65	<u>2.4</u>	2.0	1.9	0.2	0.9	<1.0		-	0.2	7.7							48
3. 36"	51	7.4	1.00	<u>4.1</u>	3.2	2.6	0.1	1.2	<1.0		-	0.2	24.5							54
OPTIMUM RANGES		6.0-7.5	<4.00 >0.60	(Ca > Mg + Na)			>0.4	<10	<5			>0.2 <1.5		>12.0	>150	>2.0	>5.0	>8.0	>1.0	>20

RED = LOW BLUE = HIGH <u>DOMINANT SOLUBLE SALT IS UNDERLINED</u>. SEE ENCLOSED INTERPRETATION GUIDES.

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SAM MODESITT - CHEMIST

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SOIL ANALYSIS

Client: M.R.W.P.C.A.
#5 HARRIS COURT
MONTEREY, CALIFORNIA 93946

Lab No.: 11-06S080 PO #016025
Sampled Date: 11-02-00
Submitted Date: 11-06-00
Report Date: 11-13-00
Submitted By: JEFF PARKER

Material: SOIL -

RANCH: WILDER RANCH - CONTROL SITE #1

DESCRIPTION		% SP	pH	EC dS/m	Ca (meq/L)	Mg (meq/L)	Na (meq/L)	K (meq/L)	Cl (meq/L)	ESP	GYP - LIME Tons/Acre REQ or Presence	B (PPM)	NO_3N (PPM)	PO_4P (PPM)	K AA (PPM)	Zn (PPM)	Mn (PPM)	Fe (PPM)	Cu (PPM)	SO_4S (PPM)
1. Block #4	12"	55	6.9	1.33	5.7	4.6	2.8	0.2	1.2	<1.0	-	0.2	21.9							81
2.	24"	60	7.2	1.08	4.4	3.9	2.3	0.1	1.0	<1.0	++	0.2	16.8							73
3.	36"	50	7.7	0.88	3.4	3.1	2.2	0.1	1.0	<1.0	+++	0.1	14.1							50
OPTIMUM RANGES			6.0- 7.5	<4.00 >0.60	(Ca > Mg + Na)			>0.4	<10	<5		>0.2 <1.5		>12.0	>150	>2.0	>5.0	>8.0	>1.0	>20

RED = LOW BLUE = HIGH DOMINANT SOLUBLE SALT IS UNDERLINED. SEE ENCLOSED INTERPRETATION GUIDES.

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SOIL ANALYSIS

Client: M.R.W.P.C.A.
#5 HARRIS COURT
MONTEREY, CALIFORNIA 93946

Lab No.: 03-15S146 PO #016025
Sampled Date: 03-12-01
Submitted Date: 03-15-01
Report Date: 03-23-01
Submitted By: WILLIAM FRANKS

Material: SOIL -

RANCH: WILDER RANCH - CONTROL SITE #1

		%			------------meq/L-------------						Tons/Acre	------------------PPM------------------								
DESCRIPTION		SP	pH	EC dS/m	Ca	Mg	Na	K	Cl	ESP	GYP - LIME REQ or Presence	B	NO_3N	PO_4P	K AA	Zn	Mn	Fe	Cu	SO_4S
1. Blk #4	12"	55	6.6	4.62	25.1	15.2	5.0	0.9	3.6	<1.0	-	0.2	50.4							789
2.	24"	59	6.5	2.41	11.6	8.3	3.7	0.5	1.6	<1.0	-	0.2	94.0							183
3.	36"	58	7.5	1.03	4.3	3.6	2.3	0.1	1.0	<1.0	+++	0.2	26.4							106
OPTIMUM RANGES			6.0-7.5	<4.00 >0.60	(Ca > Mg + Na)			>0.4	<10	<5		>0.2 <1.5		>12.0	>150	>2.0	>5.0	>8.0	>1.0	>20

RED = LOW BLUE = HIGH DOMINANT SOLUBLE SALT IS UNDERLINED. SEE ENCLOSED INTERPRETATION GUIDES.

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SOIL ANALYSIS

Client: M.R.W.P.C.A.
#5 HARRIS COURT
MONTEREY, CALIFORNIA 93946

Lab No.: 06-28S638 PO #016025
Sampled Date: 06-26-01
Submitted Date: 06-28-01
Report Date: 07-05-01
Submitted By:

Material: SOIL -

RANCH: WILDER RANCH - CONTROL SITE #1

DESCRIPTION		% SP	pH	EC dS/m	meq/L Ca	meq/L Mg	meq/L Na	meq/L K	meq/L Cl	ESP	Tons/Acre GYP - LIME (REQ or Presence)	PPM B	PPM NO_3N	PPM PO_4P	PPM K AA	PPM Zn	PPM Mn	PPM Fe	PPM Cu	PPM SO_4S
1. Blk #4	12"	56	6.5	1.86	<u>9.3</u>	5.9	3.0	0.5	1.1	<1.0	-	0.2	20.4							164
2.	24"	65	6.6	1.49	<u>6.5</u>	5.2	2.9	0.3	1.2	<1.0	-	0.2	40.4							114
3.	36"	61	7.4	1.14	<u>5.0</u>	3.9	2.4	0.1	0.8	<1.0	++++	0.2	20.6							80
OPTIMUM RANGES			6.0-7.5	<4.00 >0.60	(Ca > Mg + Na)			>0.4	<10	<5		>0.2 <1.5		>12.0	>150	>2.0	>5.0	>8.0	>1.0	>20

RED = LOW BLUE = HIGH <u>DOMINANT SOLUBLE SALT IS UNDERLINED</u>. SEE ENCLOSED INTERPRETATION GUIDES.

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SOIL ANALYSIS

Client: M.R.W.P.C.A.
#5 HARRIS COURT
MONTEREY, CALIFORNIA 93946

Lab No.: 10-09S166 PO #016025
Sampled Date:
Submitted Date: 10-09-01
Report Date: 10-17-01
Submitted By: JEFF PARKER

Material: SOIL - Control
RANCH: WILDER RANCH - SITE #1

DESCRIPTION		% SP	pH	EC dS/m	Ca (meq/L)	Mg (meq/L)	Na (meq/L)	K (meq/L)	Cl (meq/L)	ESP	GYP - LIME (Tons/Acre, REQ or Presence)	B (PPM)	NO_3N (PPM)	PO_4P (PPM)	K AA (PPM)	Zn (PPM)	Mn (PPM)	Fe (PPM)	Cu (PPM)	SO_4S (PPM)
1. BLOCK	12"	56	6.7	1.49	<u>7.5</u>	4.4	2.6	0.4	2.2	<1.0	-	0.2	63.3							110
2.	24"	60	7.1	1.50	<u>7.1</u>	4.8	2.8	0.3	1.4	<1.0	-	0.1	102.8							81
3.	36"	61	7.5	1.17	<u>5.0</u>	4.0	2.6	0.2	1.9	<1.0	+++	0.2	49.1							59
OPTIMUM RANGES			6.0- 7.5	<4.00 >0.60	(Ca > Mg + Na)			>0.4	<10	<5		>0.2 <1.5		>12.0	>150	>2.0	>5.0	>8.0	>1.0	>20

RED = LOW BLUE = HIGH DOMINANT SOLUBLE SALT IS UNDERLINED. SEE ENCLOSED INTERPRETATION GUIDES.

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SOIL ANALYSIS

Client: M.R.W.P.C.A.
#5 HARRIS COURT
MONTEREY, CALIFORNIA 93946

Lab No.: 03-18S183 PO #016025
Sampled Date: 03-14-02
Submitted Date: 03-18-02
Report Date: 04-02-02
Submitted By:

Material: SOIL -
RANCH: WILDER RANCH - CONTROL SITE #1

	%			------------meq/L				--------------		Tons/Acre		---------------------PPM								----------------------
	SP	pH	EC	Ca	Mg	Na	K	Cl	ESP	GYP -	LIME	B	NO_3N	PO_4P	K	Zn	Mn	Fe	Cu	SO_4S
DESCRIPTION			dS/m							REQ or Presence					AA					
1. Blk #14 12"	57	6.4	4.17	20.8	15.4	4.9	0.6	2.5	<1.0		-	0.2	27.1							300
2. 24"	52	6.7	4.04	18.9	15.8	5.4	0.4	2.8	<1.0		-	0.2	92.3							165
3. 36"	57	7.6	2.16	9.5	8.4	3.6	0.2	1.9	<1.0		+++	0.1	63.2							87
OPTIMUM RANGES		6.0-7.5	<4.00 >0.60	(Ca > Mg + Na)			>0.4	<10	<5			>0.2 <1.5		>12.0	>150	>2.0	>5.0	>8.0	>1.0	>20

RED = LOW BLUE = HIGH **DOMINANT SOLUBLE SALT IS UNDERLINED.** SEE ENCLOSED INTERPRETATION GUIDES.

IF YOU SHOULD HAVE ANY QUESTIONS, PLEASE CALL.

SAM MODESITT - CHEMIST

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Tulare, California 93274
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Fax: 559 - 688-5768

SOIL ANALYSIS

Client: M.R.W.P.C.A.
#5 HARRIS COURT
MONTEREY, CALIFORNIA 93946

Lab No.: 06-06S108 PO #016025
Sampled Date: 06-04-02
Submitted Date: 06-06-02
Report Date: 06-11-02
Submitted By: WILLIAM FRANKS

Material: SOIL -
RANCH: WILDER RANCH - CONTROL SITE #1

DESCRIPTION	% SP	pH	EC dS/m	Ca (meq/L)	Mg (meq/L)	Na (meq/L)	K (meq/L)	Cl (meq/L)	ESP	GYP (Tons/Acre REQ or Presence)	LIME (Tons/Acre REQ or Presence)	B (PPM)	NO_3N (PPM)	PO_4P (PPM)	K AA (PPM)	Zn (PPM)	Mn (PPM)	Fe (PPM)	Cu (PPM)	SO_4S (PPM)
1. Blk #4 12"	62	6.5	3.10	14.9	10.7	4.8	0.6	2.9	<1.0		-	0.3	56.0							193
2. 24"	66	6.7	3.65	17.2	13.0	6.0	0.4	3.6	<1.0		-	0.4	46.1							229
3. 36"	65	7.3	3.20	13.8	12.7	5.3	0.1	2.4	<1.0		++++	0.3	48.1							157
OPTIMUM RANGES		6.0-7.5	<4.00 >0.60	(Ca > Mg + Na)			>0.4	<10	<5			>0.2 <1.5		>12.0	>150	>2.0	>5.0	>8.0	>1.0	>20

RED = LOW BLUE = HIGH DOMINANT SOLUBLE SALT IS UNDERLINED. SEE ENCLOSED INTERPRETATION GUIDES.

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Tulare, California 93274
Office: 559 - 688-5684
Fax: 559 - 688-5768

SOIL ANALYSIS

Client: M.R.W.P.C.A.
#5 HARRIS COURT, Bldg D
MONTEREY, CALIFORNIA 93940-5756

Lab No.: 11-19S194 PO #000664
Sampled Date: 11-16-02
Submitted Date: 11-19-02
Report Date: 11-26-02
Submitted By: WILLIAM FRANKS

Material: SOIL -
RANCH: WILDER RACH - BLOCK 4 - SITE #1

DESCRIPTION		% SP	pH	EC dS/m	Ca (meq/L)	Mg (meq/L)	Na (meq/L)	K (meq/L)	Cl (meq/L)	ESP	Tons/Acre GYP - LIME (REQ or Presence)	B (PPM)	NO_3N (PPM)	PO_4P (PPM)	K AA (PPM)	Zn (PPM)	Mn (PPM)	Fe (PPM)	Cu (PPM)	SO_4S (PPM)
1. B-4 S-1	12"	53	6.6	5.12	27.6	17.5	5.5	0.7	6.1	<1.0	-	0.1	77.4							191
2.	24"	60	6.7	2.93	15.1	9.7	4.1	0.4	2.3	<1.0	-	0.1	52.1							100
3.	36"	67	7.4	2.03	9.0	7.5	3.6	0.2	2.5	<1.0	+++	0.1	44.7							64
OPTIMUM RANGES			6.0-7.5	<4.00 >0.60	(Ca > Mg + Na)			>0.4	<10	<5		>0.2 <1.5		>12.0	>150	>2.0	>5.0	>8.0	>1.0	>20

RED = LOW BLUE = HIGH <u>DOMINANT SOLUBLE SALT IS UNDERLINED</u>. SEE ENCLOSED INTERPRETATION GUIDES.

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AGRICULTURAL LABORATORY SERVICES

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Tulare, California 93274
Office: 559 - 688-5684
Fax: 559 - 688-5768

SOIL ANALYSIS

Client: M.R.W.P.C.A.
#5 HARRIS COURT, Bldg D
MONTEREY, CALIFORNIA 93940-5756

Lab No.: 04-11S185 PO #000664
Sampled Date: 04-09-03
Submitted Date: 04-11-03
Report Date: 04-17-03
Submitted By: WILLIAM FRANKS

Material: SOIL - Control
RANCH: WILDER RANCH - SITE 1

DESCRIPTION	% SP	pH	EC dS/m	Ca (meq/L)	Mg (meq/L)	Na (meq/L)	K (meq/L)	Cl (meq/L)	ESP	T/ac GYP REQ	LIME PRESENCE LP	B (PPM)	NO_3N (PPM)	PO_4P (PPM)	K AA (PPM)	Zn (PPM)	Mn (PPM)	Fe (PPM)	Cu (PPM)	SO_4S (PPM)
1. Blk #4 12"	66	6.5	2.74	<u>13.5</u>	9.9	3.6	0.4	1.4	<1.0		-	0.1	136.7							150
2. 24"	74	6.6	4.21	<u>18.8</u>	16.5	6.4	0.4	1.6	<1.0		-	0.2	110.8							213
3. 36"	68	7.5	2.71	<u>11.4</u>	10.7	4.7	0.2	2.3	<1.0		++	0.2	53.5							138
OPTIMUM RANGES		6.0- 7.5	<4.00 >0.60	(Ca > Mg + Na)			>0.4	<10	<5			>0.2 <1.5		>12.0	>150	>2.0	>5.0	>8.0	>1.0	>20

RED = LOW BLUE = HIGH <u>DOMINANT SOLUBLE SALT IS UNDERLINED</u>. SEE ENCLOSED INTERPRETATION GUIDES.

IF YOU SHOULD HAVE ANY QUESTIONS, PLEASE CALL.

SAM MODESITT - CHEMIST

Valley Tech
AGRICULTURAL LABORATORY SERVICES

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Tulare, California 93274
Office: 559 - 688-5684
Fax: 559 - 688-5768

SOIL ANALYSIS

Client: M.R.W.P.C.A.
#5 HARRIS COURT, Bldg D
MONTEREY, CALIFORNIA 93940-5756

Lab No.: 05-17S551 PO #000664
Sampled Date: 05-13-03
Submitted Date: 05-17-03
Report Date: 05-28-03
Submitted By:

Material: SOIL -

RANCH: WILDER RANCH - CONTROL SITE #1

DESCRIPTION	% SP	pH	EC dS/m	Ca (meq/L)	Mg (meq/L)	Na (meq/L)	K (meq/L)	Cl (meq/L)	ESP	T/ac GYP REQ	LIME PRESENCE LP	B (PPM)	NO_3N (PPM)	PO_4P (PPM)	K AA (PPM)	Zn (PPM)	Mn (PPM)	Fe (PPM)	Cu (PPM)	SO_4S (PPM)
1. Blk #4 12"	58	6.7	1.56	8.1	5.1	2.2	0.3	1.1	<1.0		-	0.1	98.2							74
2. 24"	50	7.1	1.95	9.4	7.1	2.8	0.2	1.6	<1.0		-	0.1	59.8							92
3. 36"	60	7.6	1.71	8.3	6.1	2.5	0.2	1.5	<1.0		++	0.1	66.7							80
OPTIMUM RANGES		6.0- 7.5	<4.00 >0.60	(Ca > Mg + Na)			>0.4	<10	<5			>0.2 <1.5		>12.0	>150	>2.0	>5.0	>8.0	>1.0	>20

RED = LOW BLUE = HIGH DOMINANT SOLUBLE SALT IS UNDERLINED. SEE ENCLOSED INTERPRETATION GUIDES.

IF YOU SHOULD HAVE ANY QUESTIONS, PLEASE CALL.

SAM MODESITT - CHEMIST

Valley Tech
AGRICULTURAL LABORATORY SERVICES

2120 South 'K' Street
Tulare, California 93274
Office: 559 - 688-5684
Fax: 559 - 688-5768

SOIL ANALYSIS

Client: M.R.W.P.C.A.
#5 HARRIS COURT, Bldg D
MONTEREY, CALIFORNIA 93940-5756

Lab No.: 10-31S623 PO #001223
Sampled Date: 10-28-03
Submitted Date: 10-31-03
Report Date: 11-06-03
Submitted By: WILLIAM FRANKS

Material: SOIL -

RANCH: WILDER RANCH - CONTROL SITE #1

DESCRIPTION	% SP	pH	EC dS/m	meq/L Ca	meq/L Mg	meq/L Na	meq/L K	meq/L Cl	ESP	T/ac GYP REQ	LIME PRESENCE LP	PPM B	PPM NO_3N	PPM PO_4P	PPM K AA	PPM Zn	PPM Mn	PPM Fe	PPM Cu	PPM SO_4S
1. Blk #4 12"	51	6.9	2.92	13.9	10.5	4.4	0.4	7.9	<1.0		-	0.2	59.5							91
2. 24"	61	6.9	2.61	11.7	10.1	4.0	0.3	7.7	<1.0		-	0.2	37.3							108
3. 36"	54	7.8	2.90	13.2	11.2	4.5	0.2	9.0	<1.0		++++	0.1	27.0							107
OPTIMUM RANGES		6.0- 7.5	<4.00 >0.60	(Ca > Mg + Na)			>0.4	<10	<5			>0.2 <1.5		>12.0	>150	>2.0	>5.0	>8.0	>1.0	>20

RED = LOW BLUE = HIGH DOMINANT SOLUBLE SALT IS UNDERLINED. SEE ENCLOSED INTERPRETATION GUIDES.

IF YOU SHOULD HAVE ANY QUESTIONS, PLEASE CALL.

SAM MODESITT - CHEMIST

Valley Tech
AGRICULTURAL LABORATORY SERVICES

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Office: 559 - 688-5684
Fax: 559 - 688-5768

SOIL ANALYSIS

Client: M.R.W.P.C.A.
#5 HARRIS COURT, Bldg D
MONTEREY, CALIFORNIA 93940-5756

Lab No.: 01-27S141 PO #001223
Sampled Date: 01-23-04
Submitted Date: 01-27-04
Report Date: 02-04-04
Submitted By: BILL FRANKS

Material: SOIL -
RANCH: WILDER RANCH - CONTROL SITE #1

DESCRIPTION	% SP	pH	EC dS/m	Ca (meq/L)	Mg (meq/L)	Na (meq/L)	K (meq/L)	Cl (meq/L)	ESP	T/ac GYP REQ	LIME PRESENCE LP	B (PPM)	NO_3N (PPM)	PO_4P (PPM)	K AA (PPM)	Zn (PPM)	Mn (PPM)	Fe (PPM)	Cu (PPM)	SO_4S (PPM)
1. Blk #4 12"	50	7.4	1.23	6.1	2.5	6.0	0.3	1.2	2.9		-	0.2	56.7							67
2. 24"	61	7.0	2.03	11.5	10.9	4.8	0.3	9.8	<1.0		-	0.1	78.5							138
3. 36"	53	7.4	1.76	9.9	10.0	4.4	0.3	9.2	<1.0		++++	0.1	34.4							127
OPTIMUM RANGES		6.0- 7.5	<4.00 >0.60	(Ca > Mg + Na)			>0.4	<10	<5			>0.2 <1.5		>12.0	>150	>2.0	>5.0	>8.0	>1.0	>50

RED = LOW BLUE = HIGH DOMINANT SOLUBLE SALT IS UNDERLINED. SEE ENCLOSED INTERPRETATION GUIDES.

IF YOU SHOULD HAVE ANY QUESTIONS, PLEASE CALL.

SAM MODESITT - CHEMIST

Valley Tech

AGRICULTURAL LABORATORY SERVICES

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Tulare, California 93274
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Fax: 559 - 688-5768

SOIL ANALYSIS

Client: M.R.W.P.C.A.
#5 HARRIS COURT, Bldg D
MONTEREY, CALIFORNIA 93940-5756

Lab No.: 05-17S401 PO #001223
Sampled Date: 05-13-04
Submitted Date: 05-17-04
Report Date: 05-21-04
Submitted By: WILLIAM FRANKS

Material: SOIL -
RANCH: WILDER RANCH - CONTROL SITE ~~#4~~ 1

DESCRIPTION	% SP	pH	EC dS/m	Ca (meq/L)	Mg (meq/L)	Na (meq/L)	K (meq/L)	Cl (meq/L)	ESP	T/ac GYP REQ	LIME PRESENCE LP	B (PPM)	NO_3N (PPM)	PO_4P (PPM)	K AA (PPM)	Zn (PPM)	Mn (PPM)	Fe (PPM)	Cu (PPM)	SO_4S (PPM)
1. Blk #1 12"	57	6.6	3.62	<u>18.3</u>	13.9	5.2	0.7	5.8	<1.0		-	0.2	135.7							98
2. 24"	56	6.9	2.23	<u>10.0</u>	7.2	3.7	0.3	29.3	<1.0		-	0.1	37.6							77
3. 36"	57	7.4	3.09	<u>14.4</u>	12.8	4.7	0.1	11.8	<1.0		+++	0.1	61.1							116
OPTIMUM RANGES		6.0- 7.5	<4.00 >0.60	(Ca > Mg + Na)			>0.4	<10	<5			>0.2 <1.5		>12.0	>150	>2.0	>5.0	>8.0	>1.0	>50

RED = LOW BLUE = HIGH <u>DOMINANT SOLUBLE SALT IS UNDERLINED</u>. SEE ENCLOSED INTERPRETATION GUIDES.

IF YOU SHOULD HAVE ANY QUESTIONS, PLEASE CALL.

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SOIL ANALYSIS

Client: M.R.W.P.C.A.
#5 HARRIS COURT, Bldg D
MONTEREY, CALIFORNIA 93940-5756

Lab No.: 07-27S632 PO #001785
Sampled Date: 07-23-04
Submitted Date: 07-23-04
Report Date: 08-04-04
Submitted By:

Material: SOIL -

RANCH: WILDER RANCH - CONTROL SITE #1

DESCRIPTION	% SP	pH	EC dS/m	Ca (meq/L)	Mg (meq/L)	Na (meq/L)	K (meq/L)	Cl (meq/L)	ESP	T/ac GYP REQ	LIME PRESENCE LP	B (PPM)	NO_3N (PPM)	PO_4P (PPM)	K AA (PPM)	Zn (PPM)	Mn (PPM)	Fe (PPM)	Cu (PPM)	SO_4S (PPM)
1. Blk #4 12"	62	6.5	3.80	<u>17.0</u>	12.0	4.6	0.7	11.7	<1.0		-	0.1	111.4							142
2. 24"	60	6.9	2.33	<u>11.4</u>	9.5	4.0	0.3	12.2	<1.0		-	0.1	32.3							90
3. 36"	67	7.3	2.55	<u>11.3</u>	10.3	4.4	0.1	11.5	<1.0		++	0.1	29.0							78
OPTIMUM RANGES		6.0-7.5	<4.00 >0.60	(Ca > Mg + Na)			>0.4	<10	<5			>0.2 <1.5		>12.0	>150	>2.0	>5.0	>8.0	>1.0	>50

RED = LOW BLUE = HIGH DOMINANT SOLUBLE SALT IS UNDERLINED. SEE ENCLOSED INTERPRETATION GUIDES.

IF YOU SHOULD HAVE ANY QUESTIONS, PLEASE CALL.

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SOIL ANALYSIS

Client: M.R.W.P.C.A.
#5 HARRIS COURT, Bldg D
MONTEREY, CALIFORNIA 93940-5756

Lab No.: 11-10S103 PO #001785
Sampled Date: 11-06-04
Submitted Date: 11-10-04
Report Date: 11-19-04
Submitted By: WILLIAM FRANKS

Material: SOIL -

RANCH: WILDER RANCH - CONTROL SITE #1

DESCRIPTION	% SP	pH	EC dS/m	Ca (meq/L)	Mg (meq/L)	Na (meq/L)	K (meq/L)	Cl (meq/L)	ESP	T/ac GYP REQ	LIME PRESENCE LP	B (PPM)	NO_3N (PPM)	PO_4P (PPM)	K AA (PPM)	Zn (PPM)	Mn (PPM)	Fe (PPM)	Cu (PPM)	SO_4S (PPM)
1. Blk #4 12"	57	6.4	5.62	31.8	19.0	6.6	0.9	16.3	<1.0		-	0.2	226.1							88
2. 24"	57	6.9	3.49	16.3	10.3	5.0	0.3	18.2	<1.0		-	0.1	62.2							109
3. 36"	63	7.6	2.80	14.4	10.6	4.7	0.1	14.6	<1.0		++++	0.1	38.2							122
OPTIMUM RANGES		6.0-7.5	<4.00 >0.60	(Ca > Mg + Na)			>0.4	<10	<5			>0.2 <1.5		>12.0	>150	>2.0	>5.0	>8.0	>1.0	>50

RED = LOW BLUE = HIGH DOMINANT SOLUBLE SALT IS UNDERLINED. SEE ENCLOSED INTERPRETATION GUIDES.

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SOIL ANALYSIS

Client: M.R.W.P.C.A.
#5 HARRIS COURT, Bldg D
MONTEREY, CALIFORNIA 93940-5756

Lab No.: 04-22S434 PO #001785
Sampled Date: 04-20-05
Submitted Date: 04-22-05
Report Date: 05-02-05
Submitted By: WILLIAM FRANKS

Material: SOIL -
RANCH: WILDER RANCH - CONTROL SITE #1

DESCRIPTION	% SP	pH	EC dS/m	---meq/L--- Ca	Mg	Na	K	Cl	ESP	T/ac GYP REQ	LIME PRESENCE LP	---PPM--- B	NO_3N	PO_4P	K AA	Zn	Mn	Fe	Cu	SO_4S
1. Blk #4 12"	62	7.0	1.26	<u>6.5</u>	3.3	2.6	0.4	0.7	<1.0		-	0.1	29.7							62
2. 24"	61	7.2	1.44	<u>6.7</u>	4.5	3.4	0.3	2.1	<1.0		-	0.1	26.1							70
3. 36"	65	7.5	2.40	<u>11.9</u>	9.0	4.4	0.2	9.4	<1.0		++++	0.1	44.2							87
OPTIMUM RANGES		6.0- 7.5	<4.00 >0.60	(Ca > Mg + Na)			>0.4	<10	<5			>0.2 <1.5		>12.0	>150	>2.0	>5.0	>8.0	>1.0	>50

RED = LOW BLUE = HIGH <u>DOMINANT SOLUBLE SALT IS UNDERLINED</u>. SEE ENCLOSED INTERPRETATION GUIDES.

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SOIL ANALYSIS

Client: M.R.W.P.C.A.
#5 HARRIS COURT, Bldg D
MONTEREY, CALIFORNIA 93940-5756

Lab No.: 07-18S385 PO #002409
Sampled Date:
Submitted Date: 07-18-05
Report Date: 07-26-05
Submitted By: WILLIAM FRANKS

Material: SOIL -
RANCH: WILDER RANCH - CONTROL SITE #1

DESCRIPTION	% SP	pH	EC dS/m	Ca (meq/L)	Mg (meq/L)	Na (meq/L)	K (meq/L)	Cl (meq/L)	ESP	T/ac GYP REQ	LIME PRESENCE LP	B (PPM)	NO_3N (PPM)	PO_4P (PPM)	K AA (PPM)	Zn (PPM)	Mn (PPM)	Fe (PPM)	Cu (PPM)	SO_4S (PPM)
1. Blk #4 12"	61	6.6	2.34	<u>13.0</u>	6.7	3.9	0.4	9.8	<1.0		-	0.3	76.5							35
2. 24"	62	6.9	1.89	<u>9.2</u>	6.7	3.7	0.3	8.2	<1.0		-	0.2	31.0							67
3. 36"	58	7.5	2.24	<u>11.5</u>	7.5	4.3	0.2	9.3	<1.0		+++	0.1	46.0							71
OPTIMUM RANGES		6.0-7.5	<4.00 >0.60	(Ca > Mg + Na)			>0.4	<10	<5			>0.2 <1.5		>12.0	>150	>2.0	>5.0	>8.0	>1.0	>50

RED = LOW BLUE = HIGH <u>DOMINANT SOLUBLE SALT IS UNDERLINED</u>. SEE ENCLOSED INTERPRETATION GUIDES.

IF YOU SHOULD HAVE ANY QUESTIONS, PLEASE CALL.

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SOIL ANALYSIS

Client: M.R.W.P.C.A.
#5 HARRIS COURT, Bldg D
MONTEREY, CALIFORNIA 93940-5756

Lab No.: 11-23S319 PO #002409
Sampled Date: 11-11-05
Submitted Date: 11-23-05
Report Date: 12-06-05
Submitted By: BILL FRANKS

Material: SOIL -

RANCH: WILDER RANCH - CONTROL SITE #1

DESCRIPTION	% SP	pH	EC dS/m	Ca (meq/L)	Mg (meq/L)	Na (meq/L)	K (meq/L)	Cl (meq/L)	ESP	T/ac GYP REQ	LIME PRESENCE LP	B (PPM)	NO_3N (PPM)	PO_4P (PPM)	K AA (PPM)	Zn (PPM)	Mn (PPM)	Fe (PPM)	Cu (PPM)	SO_4S (PPM)
1. Blk #4 12"	71	6.5	3.86	21.2	13.0	5.6	0.6	26.4	<1.0		-	0.2	103.6							26
2. 24"	68	6.8	2.65	13.2	8.9	4.7	0.3	17.1	<1.0		-	0.1	22.4							29
3. 36"	70	7.4	1.99	9.3	6.8	3.9	0.1	11.5	<1.0		++++	0.1	17.9							24
OPTIMUM RANGES		6.0- 7.5	<4.00 >0.60	(Ca > Mg + Na)			>0.4	<10	<5			>0.2 <1.5		>12.0	>150	>2.0	>5.0	>8.0	>1.0	>50

RED = LOW BLUE = HIGH DOMINANT SOLUBLE SALT IS UNDERLINED. SEE ENCLOSED INTERPRETATION GUIDES.

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SOIL ANALYSIS

Client: M.R.W.P.C.A.
#5 HARRIS COURT, Bldg D
MONTEREY, CALIFORNIA 93940-5756

Lab No.: 11-23S319 PO #002409
Sampled Date: 11-11-05
Submitted Date: 11-23-05
Report Date: 12-06-05
Submitted By: BILL FRANKS

Material: SOIL -
RANCH: WILDER RANCH - CONTROL SITE #1

DESCRIPTION	% SP	pH	EC dS/m	Ca (meq/L)	Mg (meq/L)	Na (meq/L)	K (meq/L)	Cl (meq/L)	ESP	T/ac GYP REQ	LIME PRESENCE LP	B (PPM)	NO_3N (PPM)	PO_4P (PPM)	K AA (PPM)	Zn (PPM)	Mn (PPM)	Fe (PPM)	Cu (PPM)	SO_4S (PPM)
1. Blk #4 12"	71	6.5	3.86	<u>21.2</u>	13.0	5.6	0.6	26.4	<1.0		-	0.2	103.6							26
2. 24"	68	6.8	2.65	<u>13.2</u>	8.9	4.7	0.3	17.1	<1.0		-	0.1	22.4							29
3. 36"	70	7.4	1.99	<u>9.3</u>	6.8	3.9	0.1	11.5	<1.0		++++	0.1	17.9							24
OPTIMUM RANGES		6.0- 7.5	<4.00 >0.60	(Ca > Mg + Na)			>0.4	<10	<5			>0.2 <1.5		>12.0	>150	>2.0	>5.0	>8.0	>1.0	>50

RED = LOW BLUE = HIGH <u>DOMINANT SOLUBLE SALT IS UNDERLINED</u>. SEE ENCLOSED INTERPRETATION GUIDES.

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SOIL ANALYSIS

Client: M.R.W.P.C.A.
#5 HARRIS COURT, Bldg D
MONTEREY, CALIFORNIA 93940-5756

Material: SOIL - control site 1

RANCH:

Lab No.: 05-02S041 PO #002409
Sampled Date: 04-28-06
Submitted Date: 05-02-06
Report Date: 05-09-06
Submitted By: W. FRANKS

DESCRIPTION	% SP	pH	EC dS/m	Ca (meq/L)	Mg (meq/L)	Na (meq/L)	K (meq/L)	Cl (meq/L)	ESP	T/ac GYP REQ	LIME PRESENCE LP	B (PPM)	NO_3N (PPM)	PO_4P (PPM)	K AA (PPM)	Zn (PPM)	Mn (PPM)	Fe (PPM)	Cu (PPM)	SO_4S (PPM)
1. Blk # 12"	57	7.0	1.82	11.0	3.2	4.0	0.4	4.5	<1.0		-	0.2	53.9							98
2. 24"	59	6.9	3.28	18.5	9.4	5.6	0.3	17.2	<1.0		-	0.2	83.2							119
3. 36"	52	7.6	3.39	19.1	9.5	5.9	0.2	22.9	1.0		++++	0.1	41.0							122
OPTIMUM RANGES		6.0- 7.5	<4.00 >0.60	(Ca > Mg + Na)			>0.4	<10	<5			>0.2 <1.5		>12.0	>150	>2.0	>5.0	>8.0	>1.0	>50

RED = LOW BLUE = HIGH DOMINANT SOLUBLE SALT IS UNDERLINED. SEE ENCLOSED INTERPRETATION GUIDES.

IF YOU SHOULD HAVE ANY QUESTIONS, PLEASE CALL.

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SOIL ANALYSIS

Client:	**M.R.W.P.C.A.** **#5 HARRIS COURT, Bldg D** **MONTEREY, CALIFORNIA 93940-5756**	**Lab No.:**	**07-31S604 PO #002409**
		Sampled Date:	**07-26-06**
		Submitted Date:	**07-31-06**
		Report Date:	**08-07-06**
Material:	**SOIL -**	**Submitted By:**	**W. FRANKS**

RANCH: WILDER RANCH - CONTROL SITE #1

DESCRIPTION		% SP	pH	EC dS/m	meq/L Ca	meq/L Mg	meq/L Na	meq/L K	meq/L Cl	ESP	T/ac GYP REQ	LIME PRESENCE LP	PPM B	PPM NO_3N	PPM PO_4P	PPM K AA	PPM Zn	PPM Mn	PPM Fe	PPM Cu	PPM SO_4S
1. Blk #4	12"	45	6.8	3.78	<u>22.4</u>	9.8	6.4	0.8	22.7	1.1		-		40.8							
2.	24"	61	7.1	2.18	<u>9.7</u>	8.1	4.0	0.4	16.0	<1.0		-		18.0							
3.	36"	56	7.5	2.87	<u>15.8</u>	8.6	5.6	0.2	17.2	1.1		+++		34.2							
OPTIMUM RANGES			6.0- 7.5	<4.00 >0.60	(Ca > Mg + Na)			>0.4	<10	<5			>0.2 <1.5		>12.0	>150	>2.0	>5.0	>8.0	>1.0	>50

RED = LOW BLUE = HIGH <u>DOMINANT SOLUBLE SALT IS UNDERLINED</u>. SEE ENCLOSED INTERPRETATION GUIDES.

IF YOU SHOULD HAVE ANY QUESTIONS, PLEASE CALL.

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SOIL ANALYSIS

Client: M.R.W.P.C.A.
#5 HARRIS COURT, Bldg D
MONTEREY, CALIFORNIA 93940-5756

Lab No.: 11-15S195 PO #002409
Sampled Date: 11-09-06
Submitted Date: 11-15-06
Report Date: 12-05-06
Submitted By: WILLIAM FRANKS

Material: SOIL -

RANCH: WILDER RANCH - CONTROL SITE #1

	%			meq/L						T/ac	LIME	PPM								
DESCRIPTION	SP	pH	EC dS/m	Ca	Mg	Na	K	Cl	ESP	GYP REQ	PRESENCE LP	B	NO_3N	PO_4P	K AA	Zn	Mn	Fe	Cu	SO_4S
1. Blk #4 12"	65	7.0	3.20	18.4	7.6	5.6	0.7	17.8	1.0		-	0.2	77.4							90
2. 24"	45	7.1	1.97	11.3	4.2	4.0	0.3	13.4	<1.0		-	0.1	22.7							64
3. 36"	60	7.6	2.52	14.0	6.9	4.6	0.1	15.3	<1.0		++++	0.1	38.7							98
OPTIMUM RANGES		6.0- 7.5	<4.00 >0.60	(Ca > Mg + Na)			>0.4	<10	<5			>0.2 <1.5		>12.0	>150	>2.0	>5.0	>8.0	>1.0	>50

RED = LOW BLUE = HIGH DOMINANT SOLUBLE SALT IS UNDERLINED. SEE ENCLOSED INTERPRETATION GUIDES.

IF YOU SHOULD HAVE ANY QUESTIONS, PLEASE CALL.

SAM MODESITT - CHEMIST

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SOIL ANALYSIS

Client: M.R.W.P.C.A.
#5 HARRIS COURT, Bldg D
MONTEREY, CALIFORNIA 93940-5756

Lab No.: 04-03S042 PO #002409
Sampled Date: 03-28-07
Submitted Date: 04-03-07
Report Date: 04-17-07
Submitted By: W. FRANKS

Material: SOIL -
RANCH: WILDER RANCH - CONTROL SITE #1

DESCRIPTION	% SP	pH	EC dS/m	Ca (meq/L)	Mg (meq/L)	Na (meq/L)	K (meq/L)	Cl (meq/L)	ESP	T/ac GYP REQ	LIME PRESENCE LP	B (PPM)	NO_3N (PPM)	PO_4P (PPM)	K AA (PPM)	Zn (PPM)	Mn (PPM)	Fe (PPM)	Cu (PPM)	SO_4S (PPM)
1. Blk #4 12"	64	7.1	2.24	10.5	6.9	4.2	0.5	8.6	<1.0		-	0.1	77.5							43
2. 24"	71	6.9	3.28	16.7	10.9	5.7	0.4	15.5	1.0		-	0.1	70.6							87
3. 36"	69	7.4	3.16	14.5	12.5	5.2	0.2	18.1	<1.0		++	0.1	26.9							92
OPTIMUM RANGES		6.0- 7.5	<4.00 >0.60	(Ca > Mg + Na)			>0.4	<10	<5			>0.2 <1.5		>12.0	>150	>2.0	>5.0	>8.0	>1.0	>50

RED = LOW BLUE = HIGH DOMINANT SOLUBLE SALT IS UNDERLINED. SEE ENCLOSED INTERPRETATION GUIDES.

IF YOU SHOULD HAVE ANY QUESTIONS, PLEASE CALL.

SAM MODESITT - CHEMIST

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Fax: 559 - 688-5768

SOIL ANALYSIS

Client: M.R.W.P.C.A.
#5 HARRIS COURT, Bldg D
MONTEREY, CALIFORNIA 93940-5756

Lab No.: 05-03S086 PO #002409
Sampled Date: 04-26-07
Submitted Date: 05-03-07
Report Date: 05-14-07
Submitted By: WILLIAM FRANK

Material: SOIL -

RANCH: WILDER RANCH - CONTROL SITE #1

	%			------------meq/L				------------		T/ac	LIME	------------				PPM				------------
DESCRIPTION	SP	pH	EC dS/m	Ca	Mg	Na	K	Cl	ESP	GYP REQ	PRESENCE LP	B	NO_3N	PO_4P	K AA	Zn	Mn	Fe	Cu	SO_4S
1. Blk #4 12"	56	7.0	2.14	10.9	6.4	4.2	0.3	16.0	<1.0		-	0.2	7.8							75
2. 24"	61	7.1	3.54	19.6	11.4	5.9	0.3	22.9	<1.0		-	0.2	60.9							121
3. 36"	64	7.6	2.98	13.6	12.4	4.8	0.1	20.0	<1.0		++++	0.1	44.5							88
OPTIMUM RANGES		6.0- 7.5	<4.00 >0.60	(Ca > Mg + Na)			>0.4	<10	<5			>0.2 <1.5		>12.0	>150	>2.0	>5.0	>8.0	>1.0	>50

RED = LOW BLUE = HIGH DOMINANT SOLUBLE SALT IS UNDERLINED. SEE ENCLOSED INTERPRETATION GUIDES.

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SOIL ANALYSIS

Client: M.R.W.P.C.A.
#5 HARRIS COURT, Bldg D
MONTEREY, CALIFORNIA 93940-5756

Lab No.: 10-06S198 PO #003859
Sampled Date: 09-27-07
Submitted Date: 10-06-07
Report Date: 11-13-07
Submitted By: W. FRANKS

Material: SOIL -
RANCH: WILDER RANCH - CONTROL SITE #1

DESCRIPTION	% SP	pH	EC dS/m	Ca (meq/L)	Mg (meq/L)	Na (meq/L)	K (meq/L)	Cl (meq/L)	ESP	T/ac GYP REQ	LIME PRESENCE LP	B (PPM)	NO_3N (PPM)	PO_4P (PPM)	K AA (PPM)	Zn (PPM)	Mn (PPM)	Fe (PPM)	Cu (PPM)	SO_4S (PPM)
1. Blk #4 12"	49	7.0	3.22	<u>21.9</u>	11.4	5.8	0.6	22.5	<1.0		-	0.1	54.8							117
2. 24"	56	6.9	2.98	<u>18.8</u>	11.8	5.7	0.4	25.2	<1.0		-	0.2	29.7							97
3. 36"	50	7.6	3.22	<u>18.7</u>	15.2	5.5	0.2	25.2	<1.0		+++	0.1	29.3							103
OPTIMUM RANGES		6.0-7.5	<4.00 >0.60	(Ca > Mg + Na)			>0.4	<10	<5			>0.2 <1.5		>12.0	>150	>2.0	>5.0	>8.0	>1.0	>50

RED = LOW BLUE = HIGH <u>DOMINANT SOLUBLE SALT IS UNDERLINED</u>. SEE ENCLOSED INTERPRETATION GUIDES.

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SOIL ANALYSIS

Client:	M.R.W.P.C.A. #5 HARRIS COURT, Bldg D MONTEREY, CALIFORNIA 93940-5756	**Lab No.:**	03-10S085 PO #003859
		Sampled Date:	03-05-08
		Submitted Date:	03-10-08
		Report Date:	03-20-08
Material:	SOIL -	**Submitted By:**	WILLIAM FRANKS

RANCH: **WILDER RANCH - CONTROL SITE #1**

DESCRIPTION		% SP	pH	EC dS/m	Ca (meq/L)	Mg (meq/L)	Na (meq/L)	K (meq/L)	Cl (meq/L)	ESP	T/ac GYP REQ	LIME PRESENCE LP	B (PPM)	NO_3N (PPM)	PO_4P (PPM)	K AA (PPM)	Zn (PPM)	Mn (PPM)	Fe (PPM)	Cu (PPM)	SO_4S (PPM)
1. Blk #4	12"	61	7.0	2.65	14.5	7.9	4.7	0.5	8.0	<1.0		-	0.1	55.6							183
2.	24"	61	6.7	5.69	30.3	19.0	7.8	0.6	38.9	1.1		-	0.1	67.7							101
3.	36"	51	7.3	3.65	16.5	12.7	5.0	0.2	23.8	<1.0		+++	0.1	29.1							82
OPTIMUM RANGES			6.0-7.5	<4.00 >0.60	(Ca > Mg + Na)			>0.4	<10	<5			>0.2 <1.5		>12.0	>150	>2.0	>5.0	>8.0	>1.0	>50

RED = LOW BLUE = HIGH DOMINANT SOLUBLE SALT IS UNDERLINED. SEE ENCLOSED INTERPRETATION GUIDES.

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SOIL ANALYSIS

Client: M.R.W.P.C.A.
#5 HARRIS COURT, Bldg D
MONTEREY, CALIFORNIA 93940-5756

Lab No.: 06-18S477 PO #003859
Sampled Date: 06-13-08
Submitted Date: 06-18-08
Report Date: 07-08-08
Submitted By: WILLIAM FRANKS

Material: SOIL -
RANCH: WILDER RANCH - CONTROL SITE #1

DESCRIPTION	% SP	pH	EC dS/m	Ca (meq/L)	Mg (meq/L)	Na (meq/L)	K (meq/L)	Cl (meq/L)	ESP	T/ac GYP REQ	LIME PRESENCE LP	B (PPM)	NO_3N (PPM)	PO_4P (PPM)	K AA (PPM)	Zn (PPM)	Mn (PPM)	Fe (PPM)	Cu (PPM)	SO_4S (PPM)
1. Blk #4 12"	59	6.9	2.58	13.5	7.6	5.1	0.5	13.3	1.0		+	0.2	23.3							171
2. 24"	66	6.7	3.78	18.5	12.9	6.0	0.5	27.1	<1.0		-	0.2	58.8							115
3. 36"	61	7.4	3.36	15.6	12.6	5.3	0.2	24.2	<1.0		+++	0.1	38.8							94
OPTIMUM RANGES		6.0- 7.5	<4.00 >0.60	(Ca > Mg + Na)			>0.4	<10	<5			>0.2 <1.5		>12.0	>150	>2.0	>5.0	>8.0	>1.0	>50

RED = LOW BLUE = HIGH DOMINANT SOLUBLE SALT IS UNDERLINED. SEE ENCLOSED INTERPRETATION GUIDES.

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SOIL ANALYSIS

Client: M.R.W.P.C.A.
#5 HARRIS COURT, Bldg D
MONTEREY, CALIFORNIA 93940-5756

Lab No.: 10-13S430 PO #004430
Sampled Date: 10-10-08
Submitted Date: 10-13-08
Report Date: 10-31-08
Submitted By: WILLIAM FRANKS

Material: SOIL -

RANCH: WILDER RANCH - CONTROL SITE #1

DESCRIPTION	% SP	pH	EC dS/m	Ca (meq/L)	Mg (meq/L)	Na (meq/L)	K (meq/L)	Cl (meq/L)	ESP	T/ac GYP REQ	LIME PRESENCE LP	B (PPM)	NO_3N (PPM)	PO_4P (PPM)	K AA (PPM)	Zn (PPM)	Mn (PPM)	Fe (PPM)	Cu (PPM)	SO_4S (PPM)
1. Blk #4 12"	58	6.8	5.22	28.2	15.6	8.0	0.8	31.3	1.3		-	0.1	107.5							672
2. 24"	60	6.8	4.58	23.9	15.3	7.5	0.5	29.6	1.2		-	0.1	80.6							502
3. 36"	62	7.4	3.76	18.3	13.0	6.3	0.2	24.1	1.1		+++	0.1	101.5							337
OPTIMUM RANGES		6.0- 7.5	<4.00 >0.60	(Ca > Mg + Na)			>0.4	<10	<5			>0.2 <1.5		>12.0	>150	>2.0	>5.0	>8.0	>1.0	>50

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SOIL ANALYSIS

Client: M.R.W.P.C.A.
#5 HARRIS COURT, Bldg D
MONTEREY, CALIFORNIA 93940-5756

Lab No.: 03-26S262 PO #004430
Sampled Date: 03-26-09
Submitted Date: 03-26-09
Report Date: 03-31-09
Submitted By: WILLIAM FRANKS

Material: SOIL -
SITE: WILDER RANCH - CONTROL SITE #1

DESCRIPTION		% SP	pH	EC dS/m	Ca (meq/L)	Mg (meq/L)	Na (meq/L)	K (meq/L)	Cl (meq/L)	ESP	T/ac GYP REQ	LIME PRESENCE LP	B (PPM)	NO_3N (PPM)	SO_4S (PPM)	DTPA Mo
1. Blk #4	12"	59	7.1	0.60	<u>2.4</u>	1.3	2.2	0.2	2.2	1.1		-	0.2	6.3	30	0.08
2.	24"	65	6.9	2.51	<u>12.9</u>	7.9	5.1	0.4	12.1	1.1		-	0.2	26.2	108	0.06
3.	36"	59	7.3	3.95	<u>19.2</u>	13.7	6.7	0.2	25.8	1.2		++	0.1	47.4	84	<0.04
OPTIMUM RANGES			6.0- 7.5	<4.00 >0.60	(Ca > Mg + Na)			>0.4	<10	<5			>0.2 <1.5		>50	

RED = LOW BLUE = HIGH <u>DOMINANT SOLUBLE SALT IS UNDERLINED</u>. SEE ENCLOSED INTERPRETATION GUIDES.

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SOIL ANALYSIS

Client: M.R.W.P.C.A.
#5 HARRIS COURT, Bldg D
MONTEREY, CALIFORNIA 93940-5756

Lab No.: 05-23S1007
PO No.: 004430
Sampled Date: 05-23-09
Submitted Date: 05-23-09
Report Date: 06-01-09
Submitted By: WILLIAM FRANKS

Material: SOIL
SITE: WILDER RANCH - CONTROL SITE #1 - BLK #4

DESCRIPTION			% SP	pH	EC dS/m	Ca (meq/L)	Mg (meq/L)	Na (meq/L)	K (meq/L)	Cl (meq/L)	ESP	T/ac GYP REQ	LIME PRESENCE LP	B (PPM)	NO_3N (PPM)	SO_4S (PPM)	Mo DTPA (PPM)
1.	Blk #4	12"	62	7.0	1.22	5.8	2.8	3.4	0.4	4.9	1.2		-	0.2	13.7	42	0.08
2.		24"	68	7.0	2.72	14.3	9.3	5.4	0.3	11.0	1.1		-	0.2	28.4	125	0.07
3.		36"	62	7.3	4.80	24.4	18.9	7.1	0.2	21.7	<1.0		++	0.1	55.9	146	<0.04
OPTIMUM RANGES				6.0-7.5	<4.00 >0.60	(Ca > Mg + Na)			>0.4	<10	<5			>0.2 <1.5		>50	

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SOIL ANALYSIS

Client: M.R.W.P.C.A.
#5 HARRIS COURT, Bldg D
MONTEREY, CALIFORNIA 93940-5756

Lab No.: 11-13S273 PO #005131
Sampled Date: 11-13-09
Submitted Date: 11-13-09
Report Date: 11-20-09
Submitted By: WILLIAM FRANKS

Material: SOIL
SITE: WILDER RANCH - CONTROL SITE #1 - BLOCK #4

DESCRIPTION			% SP	pH	EC dS/m	Ca (meq/L)	Mg (meq/L)	Na (meq/L)	K (meq/L)	Cl (meq/L)	ESP	T/ac GYP REQ	LIME PRESENCE LP	B (PPM)	NO_3N (PPM)	SO_4S (PPM)	Mo DTPA (PPM)
1.	Blk #4	12"	58	6.8	6.25	<u>37.6</u>	18.3	10.6	1.2	25.3	1.7		-	0.1	53.9	350	0.08
2.		24"	61	7.0	4.25	<u>20.9</u>	12.8	8.5	0.4	33.5	1.8		-	0.1	18.2	78	0.07
3.		36"	46	7.4	5.40	<u>26.3</u>	19.8	9.5	0.1	37.3	1.6		++++	0.1	29.0	128	0.04
OPTIMUM RANGES				6.0-7.5	<4.00 >0.60	(Ca > Mg + Na)			>0.4	<10	<5			>0.2 <1.5		>50	

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SOIL ANALYSIS

Client: M.R.W.P.C.A.
#5 HARRIS COURT
MONTEREY, CALIFORNIA 93946

Lab No.: 04-05S045
Sampled Date: 03-30-00
Submitted Date: 04-05-00
Report Date: 04-12-00
Submitted By: GREG ANTOZ

Material: SOIL -

RANCH: KNIGHT CONTROL 3

	%			------------meq/L			-------------			Tons/Acre		------------------PPM								------------------
DESCRIPTION	SP	pH	EC dS/m	Ca	Mg	Na	K	Cl	ESP	GYP - REQ or Presence	LIME	B	NO_3N	PO_4P	K AA	Zn	Mn	Fe	Cu	SO_4S
1. BIK 8 0-12"	52	7.4	0.82	2.8	1.7	3.4	0.2	1.6	2.1		-	0.2								
2. 12-24"	59	7.5	0.87	1.4	2.7	4.4	0.3	2.3	3.2		-	0.3								
3. 24-36"	55	7.6	1.00	1.0	2.9	6.0	0.1	3.2	4.8		-	0.3								
OPTIMUM RANGES		6.0-7.5	<4.00 >0.60	(Ca > Mg + Na)			>0.4	<10	<5			>0.2 <1.5		>12.0	>150	>2.0	>5.0	>8.0	>1.0	>20

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SOIL ANALYSIS

Client: M.R.W.P.C.A.
#5 HARRIS COURT
MONTEREY, CALIFORNIA 93946

Lab No.: 04-05S045
Sampled Date: 03-30-00
Submitted Date: 04-05-00
Report Date: 06-12-00
Submitted By: GREG ANTOZ

Material: SOIL

RANCH: KNIGHT CONTROL 3

Sample Description		-PPM- NO_3N
1. Blk 8	0-12"	7.5
2.	12-24"	9.5
3.	24-36"	9.1

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SOIL ANALYSIS

Client: M.R.W.P.C.A.
#5 HARRIS COURT
MONTEREY, CALIFORNIA 93946

Lab No.: 06-28S535
Sampled Date: 06-24-00
Submitted Date: 06-28-00
Report Date: 07-05-00
Submitted By: JEFF PARKER

Material: SOIL -
RANCH: KNIGHT RANCH - CONTROL SITE #3

DESCRIPTION	% SP	pH	EC dS/m	Ca (meq/L)	Mg (meq/L)	Na (meq/L)	K (meq/L)	Cl (meq/L)	ESP	Tons/Acre GYP - REQ	Tons/Acre LIME or Presence	B (PPM)	NO_3N (PPM)	PO_4P (PPM)	K AA (PPM)	Zn (PPM)	Mn (PPM)	Fe (PPM)	Cu (PPM)	SO_4S (PPM)
1. Blk 8 12"	47	7.3	0.47	1.2	0.8	<u>2.5</u>	0.2	1.2	2.4		-	0.3	4.0							9
2. 24"	41	7.2	0.45	1.2	0.8	<u>2.3</u>	0.2	1.0	2.1		-	0.2	3.7							21
3. 36"	42	8.1	1.06	2.2	2.7	<u>5.6</u>	0.1	2.4	3.8		++	0.2	3.2							75
OPTIMUM RANGES		6.0-7.5	<4.00 >0.60	(Ca > Mg + Na)			>0.4	<10	<5			>0.2 <1.5		>12.0	>150	>2.0	>5.0	>8.0	>1.0	>20

RED = LOW BLUE = HIGH DOMINANT SOLUBLE SALT IS UNDERLINED. SEE ENCLOSED INTERPRETATION GUIDES.

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SOIL ANALYSIS

Client:	M.R.W.P.C.A. #5 HARRIS COURT MONTEREY, CALIFORNIA 93946	Lab No.:	11-06S079 PO #016025
		Sampled Date:	11-01-00
		Submitted Date:	11-06-00
		Report Date:	11-13-00
Material:	SOIL -	Submitted By:	JEFF PARKER

RANCH: KNIGHT RANCH - CONTROL SITE #3

DESCRIPTION		% SP	pH	EC dS/m	Ca (meq/L)	Mg (meq/L)	Na (meq/L)	K (meq/L)	Cl (meq/L)	ESP	Tons/Acre GYP - LIME REQ or Presence	B (PPM)	NO_3N (PPM)	PO_4P (PPM)	K AA (PPM)	Zn (PPM)	Mn (PPM)	Fe (PPM)	Cu (PPM)	SO_4S (PPM)
1. Block #8	12"	55	7.6	1.41	4.5	4.9	4.4	0.4	1.3	1.7	-	0.3	14.4							64
2.	24"	56	7.8	0.51	1.7	0.7	2.6	0.1	1.1	2.2	-	0.3	6.9							21
3.	36"	62	8.1	0.52	0.5	1.4	3.2	0.1	1.2	3.3	+++	0.2	7.3							28
OPTIMUM RANGES			6.0- 7.5	<4.00 >0.60	(Ca > Mg + Na)			>0.4	<10	<5		>0.2 <1.5		>12.0	>150	>2.0	>5.0	>8.0	>1.0	>20

RED = LOW BLUE = HIGH DOMINANT SOLUBLE SALT IS UNDERLINED. SEE ENCLOSED INTERPRETATION GUIDES.

IF YOU SHOULD HAVE ANY QUESTIONS, PLEASE CALL.

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SOIL ANALYSIS

Client: M.R.W.P.C.A.
#5 HARRIS COURT
MONTEREY, CALIFORNIA 93946

Lab No.: 03-12S087 PO #016025
Sampled Date: 03-08-01
Submitted Date: 03-12-01
Report Date: 03-23-01
Submitted By: WILLIAM FRANKS

Material: SOIL -
RANCH: KNIGHT RANCH - CONTROL SITE #3

	%			------------	meq/L	--------------				Tons/Acre		----------	----------	----------	PPM	----------	----------	----------	----------	----------
DESCRIPTION	SP	pH	EC dS/m	Ca	Mg	Na	K	Cl	ESP	GYP - REQ or Presence	LIME	B	NO_3N	PO_4P	K AA	Zn	Mn	Fe	Cu	SO_4S
1. BIK #8 12"	51	7.5	1.17	3.7	3.9	<u>3.8</u>	0.4	1.7	1.6		-	0.3	13.7							104
2. 24"	55	7.3	1.36	3.8	4.8	<u>4.7</u>	0.3	2.1	2.0		-	0.3	27.5							98
3. 36"	67	7.6	0.67	0.9	2.0	<u>3.7</u>	0.1	1.6	3.2		+++	0.3	9.6							54
OPTIMUM RANGES		6.0-7.5	<4.00 >0.60	(Ca > Mg + Na)			>0.4	<10	<5			>0.2 <1.5		>12.0	>150	>2.0	>5.0	>8.0	>1.0	>20

RED = LOW BLUE = HIGH <u>DOMINANT SOLUBLE SALT IS UNDERLINED</u>. SEE ENCLOSED INTERPRETATION GUIDES.

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SAM MODESITT - CHEMIST

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SOIL ANALYSIS

Client:	M.R.W.P.C.A. #5 HARRIS COURT MONTEREY, CALIFORNIA 93946	**Lab No.:**	08-03S079 PO #016025
		Sampled Date:	08-01-01
		Submitted Date:	08-03-01
		Report Date:	08-09-01
Material:	SOIL -	**Submitted By:**	

RANCH: KNIGHT RANCH - CONTROL SITE #3

DESCRIPTION		% SP	pH	EC dS/m	meq/L Ca	Mg	Na	K	Cl	ESP	Tons/Acre GYP - LIME REQ or Presence	PPM B	NO$_3$N	PO$_4$P	K AA	Zn	Mn	Fe	Cu	SO$_4$S
1. Blk 8	12"	53	7.5	0.66	2.2	1.6	**2.5**	0.3	1.1	1.4	-	0.4	3.8							24
2.	24"	51	7.6	0.29	1.0	0.5	**1.2**	0.1	0.5	<1.0	-	0.2	3.2							11
3.	36"	57	7.9	0.82	2.2	1.2	**4.6**	0.2	2.0	3.9	++	0.4	7.2							36
OPTIMUM RANGES			6.0- 7.5	<4.00 >0.60	(Ca > Mg + Na)			>0.4	<10	<5		>0.2 <1.5		>12.0	>150	>2.0	>5.0	>8.0	>1.0	>20

RED = LOW BLUE = HIGH DOMINANT SOLUBLE SALT IS UNDERLINED. SEE ENCLOSED INTERPRETATION GUIDES.

IF YOU SHOULD HAVE ANY QUESTIONS, PLEASE CALL.

SAM MODESITT - CHEMIST

Valley Tech
AGRICULTURAL LABORATORY SERVICES

2120 South 'K' Street
Tulare, California 93274
Office: 559 - 688-5684
Fax: 559 - 688-5768

SOIL ANALYSIS

Client: M.R.W.P.C.A.
#5 HARRIS COURT
MONTEREY, CALIFORNIA 93946

Lab No.: 11-06S066 PO #016025
Sampled Date: 11-01-01
Submitted Date: 11-06-01
Report Date: 11-13-01
Submitted By:

Material: SOIL -
RANCH: KNIGHT RANCH - CONTROL SITE #3

DESCRIPTION	% SP	pH	EC dS/m	Ca (meq/L)	Mg (meq/L)	Na (meq/L)	K (meq/L)	Cl (meq/L)	ESP	GYP - LIME (Tons/Acre, REQ or Presence)	B (PPM)	NO_3N (PPM)	PO_4P (PPM)	K AA (PPM)	Zn (PPM)	Mn (PPM)	Fe (PPM)	Cu (PPM)	SO_4S (PPM)
1. Blk #8 12"	51	7.3	0.60	2.0	1.5	2.2	0.3	1.4	1.2	-	0.2	14.3							18
2. 24"	53	7.3	0.61	1.6	1.6	2.7	0.2	1.2	1.8	-	0.2	10.1							29
3. 36"	51	7.7	0.59	1.5	1.1	3.1	0.2	1.8	2.8	++++	0.2	14.7							25
OPTIMUM RANGES		6.0- 7.5	<4.00 >0.60	(Ca > Mg + Na)			>0.4	<10	<5		>0.2 <1.5		>12.0	>150	>2.0	>5.0	>8.0	>1.0	>20

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Fax: 559 - 688-5768

SOIL ANALYSIS

Client: M.R.W.P.C.A.
#5 HARRIS COURT
MONTEREY, CALIFORNIA 93946

Lab No.: 03-18S181 PO #016025
Sampled Date: 03-13-02
Submitted Date: 03-18-02
Report Date: 04-02-02
Submitted By:

Material: SOIL -

RANCH: KNIGHT RANCH - CONTROL SITE #3

	%			------------meq/L						Tons/Acre		----------PPM								
DESCRIPTION	SP	pH	EC dS/m	Ca	Mg	Na	K	Cl	ESP	GYP REQ	- LIME or Presence	B	NO_3N	PO_4P	K AA	Zn	Mn	Fe	Cu	SO_4S
1. Blk #8 12"	52	7.4	0.60	2.0	1.3	2.6	0.2	1.5	1.7		-	0.2	1.7							20
2. 24"	50	7.3	0.65	2.0	1.1	3.2	0.1	1.7	2.5		-	0.2	1.4							24
3. 36"	54	7.9	0.69	1.4	1.4	4.0	0.1	2.2	3.6		+++	0.2	14.5							20
OPTIMUM RANGES		6.0- 7.5	<4.00 >0.60	(Ca > Mg + Na)			>0.4	<10	<5			>0.2 <1.5		>12.0	>150	>2.0	>5.0	>8.0	>1.0	>20

RED = LOW BLUE = HIGH DOMINANT SOLUBLE SALT IS UNDERLINED. SEE ENCLOSED INTERPRETATION GUIDES.

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SOIL ANALYSIS

Client: M.R.W.P.C.A.
#5 HARRIS COURT, Bldg D
MONTEREY, CALIFORNIA 93940-5756

Lab No.: 08-09S162 PO #000664
Sampled Date: 08-06-02
Submitted Date: 08-09-02
Report Date: 08-13-02
Submitted By: WILLIAM FRANKS

Material: SOIL -
RANCH: KNIGHT RANCH - CONTROL SITE 3

	%			------------	meq/L	------------				Tons/Acre		------------	------------	------------	PPM	------------	------------	------------	------------	------------
DESCRIPTION	SP	pH	EC dS/m	Ca	Mg	Na	K	Cl	ESP	GYP - REQ or Presence	LIME	B	NO_3N	PO_4P	K AA	Zn	Mn	Fe	Cu	SO_4S
1. Blk #8 12"	62	7.4	2.80	11.1	10.1	6.2	0.5	2.5	1.5		-	0.6	9.4							220
2. 24"	63	7.8	1.26	3.9	3.3	5.1	0.2	4.7	2.7		++	0.5	3.4							75
3. 36"	63	7.9	1.52	3.3	3.6	8.0	0.2	5.4	4.9		++++	0.5	11.1							72
OPTIMUM RANGES		6.0-7.5	<4.00 >0.60	(Ca > Mg + Na)			>0.4	<10	<5			>0.2 <1.5		>12.0	>150	>2.0	>5.0	>8.0	>1.0	>20

RED = LOW BLUE = HIGH DOMINANT SOLUBLE SALT IS UNDERLINED. SEE ENCLOSED INTERPRETATION GUIDES.

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SOIL ANALYSIS

Client: M.R.W.P.C.A.
#5 HARRIS COURT, Bldg D
MONTEREY, CALIFORNIA 93940-5756

Lab No.: 11-26S296 PO #000664
Sampled Date: 11-23-02
Submitted Date: 11-26-02
Report Date: 12-09-02
Submitted By: WILLIAM FRANKS

Material: SOIL -

RANCH: KNIGHT RANCH - CONTROL SITE #3

	%			meq/L						Tons/Acre		PPM								
DESCRIPTION	SP	pH	EC dS/m	Ca	Mg	Na	K	Cl	ESP	GYP - REQ or Presence	LIME	B	NO_3N	PO_4P	K AA	Zn	Mn	Fe	Cu	SO_4S
1. SITE #3 12"	65	7.3	4.10	16.0	17.0	7.2	0.8	5.5	1.3		-	0.2	78.0							253
2. 24"	56	7.4	1.21	4.3	3.1	4.6	0.2	4.5	2.2		-	0.2	11.6							65
3. 36"	64	7.6	0.78	2.4	1.3	4.0	0.1	4.7	3.0		++++	0.1	7.7							31
OPTIMUM RANGES		6.0-7.5	<4.00 >0.60	(Ca > Mg + Na)			>0.4	<10	<5			>0.2 <1.5		>12.0	>150	>2.0	>5.0	>8.0	>1.0	>20

RED = LOW BLUE = HIGH DOMINANT SOLUBLE SALT IS UNDERLINED. SEE ENCLOSED INTERPRETATION GUIDES.

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SOIL ANALYSIS

Client: M.R.W.P.C.A.
#5 HARRIS COURT, Bldg D
MONTEREY, CALIFORNIA 93940-5756

Lab No.: 03-25S254 PO #000664
Sampled Date: 03-21-03
Submitted Date: 03-25-03
Report Date: 04-02-03
Submitted By: WILLIAM FRANKS

Material: SOIL -
RANCH: KNIGHT RANCH control site 3

	%			-------meq/L						T/ac	LIME	------------PPM								
DESCRIPTION	SP	pH	EC dS/m	Ca	Mg	Na	K	Cl	ESP	GYP REQ	PRESENCE LP	B	NO_3N	PO_4P	K AA	Zn	Mn	Fe	Cu	SO_4S
1. Blk #8 12"	53	7.5	3.48	<u>15.0</u>	11.9	7.4	0.6	0.8	1.7		-	0.3	49.0							365
2. 24"	58	7.2	3.79	<u>12.4</u>	16.0	9.1	0.4	2.7	2.2		-	0.3	55.8							340
3. 36"	65	7.5	1.90	5.1	5.4	<u>8.3</u>	0.2	2.5	3.9		++	0.3	18.8							120
OPTIMUM RANGES		6.0-7.5	<4.00 >0.60	(Ca > Mg + Na)			>0.4	<10	<5			>0.2 <1.5		>12.0	>150	>2.0	>5.0	>8.0	>1.0	>20

RED = LOW BLUE = HIGH <u>DOMINANT SOLUBLE SALT IS UNDERLINED</u>. SEE ENCLOSED INTERPRETATION GUIDES.

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Valley Tech

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SOIL ANALYSIS

Client: M.R.W.P.C.A.
#5 HARRIS COURT, Bldg D
MONTEREY, CALIFORNIA 93940-5756

Lab No.: 08-12S215 PO #001223
Sampled Date: 08-07-03
Submitted Date: 08-12-03
Report Date: 08-21-03
Submitted By: WILLIAM FRANKS

Material: SOIL -

RANCH: KNIGHT RANCH - CONTROL SITE #3

	%			------------	meq/L	------------				T/ac	LIME	------------	------------	------------	PPM	------------	------------	------------	------------	------------
DESCRIPTION	SP	pH	EC dS/m	Ca	Mg	Na	K	Cl	ESP	GYP REQ	PRESENCE LP	B	NO_3N	PO_4P	K AA	Zn	Mn	Fe	Cu	SO_4S
1. Blk #8 12"	62	7.6	1.73	7.2	4.5	5.2	0.4	3.8	1.8		-	0.3	17.3							87
2. 24"	57	7.5	1.53	4.5	5.1	5.5	0.2	1.6	2.4		-	0.3	6.3							126
3. 36"	61	7.9	1.33	3.3	3.2	6.7	0.1	2.5	4.1		++++	0.2	4.0							103
OPTIMUM RANGES		6.0- 7.5	<4.00 >0.60	(Ca > Mg + Na)			>0.4	<10	<5			>0.2 <1.5		>12.0	>150	>2.0	>5.0	>8.0	>1.0	>20

RED = LOW BLUE = HIGH DOMINANT SOLUBLE SALT IS UNDERLINED. SEE ENCLOSED INTERPRETATION GUIDES.

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SOIL ANALYSIS

Client: M.R.W.P.C.A.
#5 HARRIS COURT, Bldg D
MONTEREY, CALIFORNIA 93940-5756

Lab No.: 11-17S168 PO #001223
Sampled Date: 11-14-03
Submitted Date: 11-17-03
Report Date: 11-25-03
Submitted By: WILLIAM FRANKS

Material: SOIL -
RANCH: KNIGHT RANCH - CONTROL SITE #3

	%			------------meq/L				-------------		T/ac	LIME	------------------------------PPM								
DESCRIPTION	SP	pH	EC dS/m	Ca	Mg	Na	K	Cl	ESP	GYP REQ	PRESENCE LP	B	NO_3N	PO_4P	K AA	Zn	Mn	Fe	Cu	SO_4S
1. Blk #8 12"	65	7.6	2.83	10.5	11.0	6.5	0.4	6.9	1.6		-	0.2	57.3							26
2. 24"	62	7.6	1.31	4.1	4.4	4.4	0.2	0.0	1.9		-	0.2	11.4							17
3. 36"	70	8.1	0.86	1.9	2.6	4.0	0.1	2.4	2.6		++++	0.2	8.3							9
OPTIMUM RANGES		6.0-7.5	<4.00 >0.60	(Ca > Mg + Na)			>0.4	<10	<5			>0.2 <1.5		>12.0	>150	>2.0	>5.0	>8.0	>1.0	>20

RED = LOW BLUE = HIGH DOMINANT SOLUBLE SALT IS UNDERLINED. SEE ENCLOSED INTERPRETATION GUIDES.

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SOIL ANALYSIS

Client: M.R.W.P.C.A.
#5 HARRIS COURT, Bldg D
MONTEREY, CALIFORNIA 93940-5756

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Lab No.: 03-10S131 PO #001223
Sampled Date: 03-05-04
Submitted Date: 03-10-04
Report Date: 03-17-04
Submitted By: WILLIAM FRANKS

Material: SOIL -

RANCH: KNIGHT RANCH - CONTROL SITE #3

DESCRIPTION	% SP	pH	EC dS/m	Ca (meq/L)	Mg (meq/L)	Na (meq/L)	K (meq/L)	Cl (meq/L)	ESP	GYP REQ T/ac	LIME PRESENCE LP	B (PPM)	NO_3N (PPM)	PO_4P (PPM)	K AA (PPM)	Zn (PPM)	Mn (PPM)	Fe (PPM)	Cu (PPM)	SO_4S (PPM)
1. Blk #8 12"	62	7.4	0.81	3.4	2.9	3.3	0.2	1.6	1.5		-	0.2	33.4							36
2. 24"	64	7.7	1.28	4.3	4.6	4.8	0.2	2.9	2.0		-	0.2	30.9							60
3. 36"	72	7.3	1.17	3.2	3.6	5.5	0.1	2.7	3.1		+++	0.2	16.5							66
OPTIMUM RANGES		6.0-7.5	<4.00 >0.60	(Ca > Mg + Na)			>0.4	<10	<5			>0.2 <1.5		>12.0	>150	>2.0	>5.0	>8.0	>1.0	>50

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SOIL ANALYSIS

Client: M.R.W.P.C.A.
#5 HARRIS COURT, Bldg D
MONTEREY, CALIFORNIA 93940-5756

Lab No.: 07-23S557 PO #001785
Sampled Date: 07-20-04
Submitted Date: 07-23-04
Report Date: 07-29-04
Submitted By:

Material: SOIL -

RANCH: KNIGHT RANCH - CONTROL SITE #3

DESCRIPTION	% SP	pH	EC dS/m	Ca (meq/L)	Mg (meq/L)	Na (meq/L)	K (meq/L)	Cl (meq/L)	ESP	T/ac GYP REQ	LIME PRESENCE LP	B (PPM)	NO_3N (PPM)	PO_4P (PPM)	K AA (PPM)	Zn (PPM)	Mn (PPM)	Fe (PPM)	Cu (PPM)	SO_4S (PPM)
1. Blk #8 12"	61	7.5	1.10	3.4	3.7	3.6	0.3	1.0	1.5		-	0.3	41.5							35
2. 24"	62	7.7	0.98	2.1	3.5	4.0	0.2	1.4	2.3		-	0.3	10.7							52
3. 36"	69	7.8	1.19	2.7	3.2	5.8	0.2	2.0	3.6		-	0.3	16.7							61
OPTIMUM RANGES		6.0- 7.5	<4.00 >0.60	(Ca > Mg + Na)			>0.4	<10	<5			>0.2 <1.5		>12.0	>150	>2.0	>5.0	>8.0	>1.0	>50

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Fax: 559 - 688-5768

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SOIL ANALYSIS

Client: M.R.W.P.C.A.
#5 HARRIS COURT, Bldg D
MONTEREY, CALIFORNIA 93940-5756

Lab No.: 11-19S214 PO #001785
Sampled Date: 11-18-04
Submitted Date: 11-19-04
Report Date: 11-24-04
Submitted By: W. FRANKS

Material: SOIL -
RANCH: KNIGHT - CONTROL SITE #3

DESCRIPTION	% SP	pH	EC dS/m	Ca (meq/L)	Mg (meq/L)	Na (meq/L)	K (meq/L)	Cl (meq/L)	ESP	T/ac GYP REQ	LIME PRESENCE LP	B (PPM)	NO_3N (PPM)	PO_4P (PPM)	K AA (PPM)	Zn (PPM)	Mn (PPM)	Fe (PPM)	Cu (PPM)	SO_4S (PPM)
1. Blk #8 12"	67	7.5	0.53	1.6	1.0	<u>2.4</u>	0.2	2.2	1.9		-	0.1	16.2							16
2. 24"	70	7.5	0.71	2.3	1.6	<u>3.2</u>	0.1	2.8	2.0		-	0.1	25.1							42
3. 36"	66	7.8	0.92	1.9	3.2	<u>4.3</u>	0.1	3.1	2.6		++++	0.1	20.4							55
OPTIMUM RANGES		6.0-7.5	<4.00 >0.60	(Ca > Mg + Na)			>0.4	<10	<5			>0.2 <1.5		>12.0	>150	>2.0	>5.0	>8.0	>1.0	>50

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IF YOU SHOULD HAVE ANY QUESTIONS, PLEASE CALL.

SAM MODESITT - CHEMIST

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SOIL ANALYSIS

Client: M.R.W.P.C.A.
#5 HARRIS COURT, Bldg D
MONTEREY, CALIFORNIA 93940-5756

Lab No.: 04-29S566 PO #001785
Sampled Date: 04-26-05
Submitted Date: 04-28-05
Report Date: 05-10-05
Submitted By: WILLIAM FRANKS

Material: SOIL -
RANCH: KNIGHT RANCH - CONTROL SITE #3

	%			------------meq/L				-------------		T/ac	LIME	--------------------				PPM				-----------------
	SP	pH	EC	Ca	Mg	Na	K	Cl	ESP	GYP	PRESENCE	B	NO_3N	PO_4P	K	Zn	Mn	Fe	Cu	SO_4S
DESCRIPTION			dS/m							REQ	LP				AA					
1. Blk #8 12"	57	7.5	0.89	3.2	1.8	3.9	0.2	6.9	2.3		-	0.2	20.1							50
2. 24"	55	7.6	1.60	4.6	6.1	5.5	0.3	1.8	2.2		-	0.2	32.5							104
3. 36"	61	7.7	1.55	2.8	6.5	6.2	0.1	3.0	2.9		+++	0.2	31.3							86
OPTIMUM RANGES		6.0- 7.5	<4.00 >0.60	(Ca > Mg + Na)			>0.4	<10	<5			>0.2 <1.5		>12.0	>150	>2.0	>5.0	>8.0	>1.0	>50

RED = LOW BLUE = HIGH DOMINANT SOLUBLE SALT IS UNDERLINED. SEE ENCLOSED INTERPRETATION GUIDES.

IF YOU SHOULD HAVE ANY QUESTIONS, PLEASE CALL.

SAM MODESITT - CHEMIST

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Fax: 559 - 688-5768

SOIL ANALYSIS

Client: M.R.W.P.C.A.
#5 HARRIS COURT, Bldg D
MONTEREY, CALIFORNIA 93940-5756

Lab No.: 06-24S459 PO #001785
Sampled Date: 06-23-05
Submitted Date: 06-24-05
Report Date: 07-01-05
Submitted By: BILL FRANKS

Material: SOIL -

RANCH: KNIGHT RANCH - CONTROL SITE #3

DESCRIPTION	% SP	pH	EC dS/m	meq/L Ca	meq/L Mg	meq/L Na	meq/L K	meq/L Cl	ESP	T/ac GYP REQ	LIME PRESENCE LP	PPM B	PPM NO_3N	PPM PO_4P	PPM K AA	PPM Zn	PPM Mn	PPM Fe	PPM Cu	PPM SO_4S
1. Blk #8 12"	65	7.8	1.10	<u>4.9</u>	2.6	3.8	0.3	0.2	1.6		-	0.3	12.4							82
2. 24"	68	7.8	1.34	4.5	3.8	<u>5.2</u>	0.2	0.8	2.5		-	0.3	15.2							108
3. 36"	72	7.9	1.72	4.1	5.8	<u>7.2</u>	0.1	2.9	3.4		++++	0.3	28.4							105
OPTIMUM RANGES		6.0-7.5	<4.00 >0.60	(Ca > Mg + Na)			>0.4	<10	<5			>0.2 <1.5		>12.0	>150	>2.0	>5.0	>8.0	>1.0	>50

RED = LOW BLUE = HIGH <u>DOMINANT SOLUBLE SALT IS UNDERLINED</u>. SEE ENCLOSED INTERPRETATION GUIDES.

IF YOU SHOULD HAVE ANY QUESTIONS, PLEASE CALL.

SAM MODESITT - CHEMIST

Valley Tech
AGRICULTURAL LABORATORY SERVICES

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Tulare, California 93274
Office: 559 - 688-5684
Fax: 559 - 688-5768

SOIL ANALYSIS

Client: M.R.W.P.C.A.
#5 HARRIS COURT, Bldg D
MONTEREY, CALIFORNIA 93940-5756

Lab No.: 11-01S009 PO #002409
Sampled Date: 10-28-05
Submitted Date: 11-01-05
Report Date: 12-06-05
Submitted By: BILL FRANKS

Material: SOIL -
RANCH: KNIGHT RANCH - CONTROL SITE #3

DESCRIPTION	% SP	pH	EC dS/m	Ca (meq/L)	Mg (meq/L)	Na (meq/L)	K (meq/L)	Cl (meq/L)	ESP	T/ac GYP REQ	LIME PRESENCE LP	B (PPM)	NO_3N (PPM)	PO_4P (PPM)	K AA (PPM)	Zn (PPM)	Mn (PPM)	Fe (PPM)	Cu (PPM)	SO_4S (PPM)
1. Blk #8 12"	55	7.5	1.11	4.0	3.3	3.7	0.2	3.8	1.6		-	0.2	13.7							24
2. 24"	62	7.9	1.02	2.5	3.5	4.3	0.2	1.5	2.4		-	0.2	4.9							30
3. 36"	68	8.1	1.10	1.7	3.9	5.2	0.1	2.1	3.2		++++	0.2	6.1							30
OPTIMUM RANGES		6.0- 7.5	<4.00 >0.60	(Ca > Mg + Na)			>0.4	<10	<5			>0.2 <1.5		>12.0	>150	>2.0	>5.0	>8.0	>1.0	>50

RED = LOW BLUE = HIGH DOMINANT SOLUBLE SALT IS UNDERLINED. SEE ENCLOSED INTERPRETATION GUIDES.

IF YOU SHOULD HAVE ANY QUESTIONS, PLEASE CALL.

SAM MODESITT - CHEMIST

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Fax: 559 - 688-5768

SOIL ANALYSIS

Client: M.R.W.P.C.A.
#5 HARRIS COURT, Bldg D
MONTEREY, CALIFORNIA 93940-5756

Lab No.: 05-08S137 PO #002409
Sampled Date: 05-03-06
Submitted Date: 05-08-06
Report Date: 05-12-06
Submitted By: W. FRANKS

Material: SOIL -
RANCH: KNIGHT RANCH - CONTROL SITE #3

DESCRIPTION	% SP	pH	EC dS/m	Ca (meq/L)	Mg (meq/L)	Na (meq/L)	K (meq/L)	Cl (meq/L)	ESP	T/ac GYP REQ	LIME PRESENCE LP	B (PPM)	NO_3N (PPM)	PO_4P (PPM)	K AA (PPM)	Zn (PPM)	Mn (PPM)	Fe (PPM)	Cu (PPM)	SO_4S (PPM)
1. Blk #8 12"	58	7.8	0.66	2.7	1.0	2.8	0.2	0.5	1.8		-	0.3	10.0							41
2. 24"	64	7.7	1.44	5.7	3.8	5.4	0.1	2.1	2.4		-	0.3	22.0							123
3. 36"	62	7.4	1.56	5.1	4.1	6.6	0.2	0.6	3.2		++	0.3	23.7							117
OPTIMUM RANGES		6.0- 7.5	<4.00 >0.60	(Ca > Mg + Na)			>0.4	<10	<5			>0.2 <1.5		>12.0	>150	>2.0	>5.0	>8.0	>1.0	>50

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SOIL ANALYSIS

Client: M.R.W.P.C.A.
#5 HARRIS COURT, Bldg D
MONTEREY, CALIFORNIA 93940-5756

Lab No.: 08-08S113 PO #002409
Sampled Date: 08-03-06
Submitted Date: 08-08-06
Report Date: 09-05-06
Submitted By: W. FRANKS

Material: SOIL -
RANCH: KNIGHT RANCH - CONTROL SITE #3

DESCRIPTION	% SP	pH	EC dS/m	Ca (meq/L)	Mg (meq/L)	Na (meq/L)	K (meq/L)	Cl (meq/L)	ESP	T/ac GYP REQ	LIME PRESENCE LP	B (PPM)	NO_3N (PPM)	PO_4P (PPM)	K AA (PPM)	Zn (PPM)	Mn (PPM)	Fe (PPM)	Cu (PPM)	SO_4S (PPM)
1. Blk #8 12"	59	7.6	1.76	8.0	5.1	4.8	0.5	3.8	1.5		-	0.3	57.4							81
2. 24"	61	7.8	0.72	2.1	1.8	3.1	0.2	0.8	2.0		++++	0.3	11.7							52
3. 36"	68	8.0	1.02	2.2	3.1	4.8	0.1	1.7	3.0		++	0.2	17.2							89
OPTIMUM RANGES		6.0- 7.5	<4.00 >0.60	(Ca > Mg + Na)			>0.4	<10	<5			>0.2 <1.5		>12.0	>150	>2.0	>5.0	>8.0	>1.0	>50

RED = LOW BLUE = HIGH **DOMINANT SOLUBLE SALT IS UNDERLINED.** SEE ENCLOSED INTERPRETATION GUIDES.

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SOIL ANALYSIS

Client: M.R.W.P.C.A.
#5 HARRIS COURT, Bldg D
MONTEREY, CALIFORNIA 93940-5756

Lab No.: 11-22S269 PO #002409
Sampled Date: 11-16-06
Submitted Date: 11-22-06
Report Date: 12-05-06
Submitted By: WILLIAM FRANKS

Material: SOIL -
RANCH: KNIGHT RANCH - CONTROL SITE 3

DESCRIPTION		% SP	pH	EC dS/m	Ca (meq/L)	Mg (meq/L)	Na (meq/L)	K (meq/L)	Cl (meq/L)	ESP	GYP REQ T/ac	LIME PRESENCE LP	B (PPM)	NO_3N (PPM)	PO_4P (PPM)	K AA (PPM)	Zn (PPM)	Mn (PPM)	Fe (PPM)	Cu (PPM)	SO_4S (PPM)
1. #3	12"	64	7.7	2.54	<u>13.2</u>	5.9	6.1	0.6	4.8	1.6		-	0.3	63.5							175
2.	24"	63	7.7	1.33	<u>5.6</u>	2.6	4.7	0.3	2.5	2.1		-	0.3	49.0							59
3.	36"	73	7.9	1.20	4.0	2.3	<u>5.3</u>	0.1	2.0	3.1		++	0.3	32.2							75
OPTIMUM RANGES			6.0- 7.5	<4.00 >0.60	(Ca > Mg + Na)			>0.4	<10	<5			>0.2 <1.5		>12.0	>150	>2.0	>5.0	>8.0	>1.0	>50

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SOIL ANALYSIS

Client: M.R.W.P.C.A.
#5 HARRIS COURT, Bldg D
MONTEREY, CALIFORNIA 93940-5756

Lab No.: 04-04S052 PO #002409
Sampled Date: 03-29-07
Submitted Date: 04-04-07
Report Date: 04-17-07
Submitted By: W. FRANKS

Material: SOIL -
RANCH: KNIGHT RANCH - CONTROL SITE #3

DESCRIPTION		% SP	pH	EC dS/m	Ca (meq/L)	Mg (meq/L)	Na (meq/L)	K (meq/L)	Cl (meq/L)	ESP	T/ac GYP REQ	LIME PRESENCE LP	B (PPM)	NO_3N (PPM)	PO_4P (PPM)	K AA (PPM)	Zn (PPM)	Mn (PPM)	Fe (PPM)	Cu (PPM)	SO_4S (PPM)
1. Blk #8	12"	64	7.6	2.69	12.6	11.1	6.0	0.5	3.3	1.3		-	0.2	67.0							211
2.	24"	66	7.5	1.80	5.5	7.4	5.3	0.3	3.8	1.8		-	0.2	59.6							71
3.	36"	69	7.8	1.32	3.4	4.4	5.6	0.1	2.2	2.8		+++	0.1	41.1							79
OPTIMUM RANGES			6.0- 7.5	<4.00 >0.60	(Ca > Mg + Na)			>0.4	<10	<5			>0.2 <1.5		>12.0	>150	>2.0	>5.0	>8.0	>1.0	>50

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SOIL ANALYSIS

Client: M.R.W.P.C.A.
#5 HARRIS COURT, Bldg D
MONTEREY, CALIFORNIA 93940-5756

Lab No.: 07-20S396 PO #002409
Sampled Date: 07-18-07
Submitted Date: 07-20-07
Report Date: 08-06-07
Submitted By: WILLIAM FRANKS

Material: SOIL -
RANCH: KNITE RANCH - CONTROL SITE

DESCRIPTION	% SP	pH	EC dS/m	Ca (meq/L)	Mg (meq/L)	Na (meq/L)	K (meq/L)	Cl (meq/L)	ESP	T/ac GYP REQ	LIME PRESENCE LP	B (PPM)	NO_3N (PPM)	PO_4P (PPM)	K AA (PPM)	Zn (PPM)	Mn (PPM)	Fe (PPM)	Cu (PPM)	SO_4S (PPM)
1. Blk #8 12"	61	7.8	1.02	<u>4.4</u>	1.9	4.1	0.3	1.1	2.1		-	0.3	14.7							46
2. 24"	62	7.7	0.93	<u>4.0</u>	1.6	3.8	0.2	1.8	2.0		-	0.3	5.1							62
3. 36"	69	8.0	1.10	2.1	4.3	<u>4.5</u>	0.1	2.3	2.4		++++	0.3	17.7							76
OPTIMUM RANGES		6.0- 7.5	<4.00 >0.60	(Ca > Mg + Na)			>0.4	<10	<5			>0.2 <1.5		>12.0	>150	>2.0	>5.0	>8.0	>1.0	>50

RED = LOW BLUE = HIGH <u>DOMINANT SOLUBLE SALT IS UNDERLINED</u>. SEE ENCLOSED INTERPRETATION GUIDES.

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SOIL ANALYSIS

Client: M.R.W.P.C.A.
#5 HARRIS COURT, Bldg D
MONTEREY, CALIFORNIA 93940-5756

Lab No.: 11-09S243 PO #003859
Sampled Date: 11-03-07
Submitted Date: 11-09-07
Report Date: 11-28-07
Submitted By: WILLIAM FRANKS

Material: SOIL -
RANCH: KNIGHT RANCH - CONTROL SITE #3

DESCRIPTION	% SP	pH	EC dS/m	meq/L Ca	meq/L Mg	meq/L Na	meq/L K	meq/L Cl	ESP	T/ac GYP REQ	LIME PRESENCE LP	PPM B	PPM NO_3N	PPM PO_4P	PPM K AA	PPM Zn	PPM Mn	PPM Fe	PPM Cu	PPM SO_4S
1. Blk #8 12"	60	7.7	2.33	9.6	8.2	6.4	0.6	4.6	1.9		-	0.3	66.1							106
2. 24"	55	7.8	1.74	7.5	5.5	5.1	0.3	4.0	1.7		-	0.2	39.0							81
3. 36"	60	7.7	1.41	3.8	5.8	4.9	0.2	3.6	2.0		+	0.2	33.7							73
OPTIMUM RANGES		6.0-7.5	<4.00 >0.60	(Ca > Mg + Na)			>0.4	<10	<5			>0.2 <1.5		>12.0	>150	>2.0	>5.0	>8.0	>1.0	>50

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SOIL ANALYSIS

Client: M.R.W.P.C.A.
#5 HARRIS COURT, Bldg D
MONTEREY, CALIFORNIA 93940-5756

Lab No.: 03-11S109 PO #003859
Sampled Date: 03-06-08
Submitted Date: 03-11-08
Report Date: 03-20-08
Submitted By: WILLIAM FRANKS

Material: SOIL -
RANCH: KNIGHT RANCH - CONTROL SITE #3

DESCRIPTION		% SP	pH	EC dS/m	Ca (meq/L)	Mg (meq/L)	Na (meq/L)	K (meq/L)	Cl (meq/L)	ESP	T/ac GYP REQ	LIME PRESENCE LP	B (PPM)	NO_3N (PPM)	PO_4P (PPM)	K AA (PPM)	Zn (PPM)	Mn (PPM)	Fe (PPM)	Cu (PPM)	SO_4S (PPM)
1. Blk #8	12"	59	7.7	1.19	4.7	3.9	3.5	0.4	0.9	1.2		-	0.2	35.7							81
2.	24"	62	7.6	2.10	7.8	7.9	5.4	0.3	3.9	1.6		-	0.2	104.1							108
3.	36"	54	7.8	1.95	7.2	6.6	6.3	0.2	4.7	2.2		+++	0.1	44.6							129
OPTIMUM RANGES			6.0-7.5	<4.00 >0.60	(Ca > Mg + Na)			>0.4	<10	<5			>0.2 <1.5		>12.0	>150	>2.0	>5.0	>8.0	>1.0	>50

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SOIL ANALYSIS

Client: M.R.W.P.C.A.
#5 HARRIS COURT, Bldg D
MONTEREY, CALIFORNIA 93940-5756

Lab No.: 07-30S718 PO #004430
Sampled Date: 07-27-08
Submitted Date: 07-30-08
Report Date: 08-11-08
Submitted By: WILLIAM FRANKS

Material: SOIL -

RANCH: KNIGHT RANCH - CONTROL SITE #3

DESCRIPTION	% SP	pH	EC dS/m	Ca (meq/L)	Mg (meq/L)	Na (meq/L)	K (meq/L)	Cl (meq/L)	ESP	T/ac GYP REQ	LIME PRESENCE LP	B (PPM)	NO_3N (PPM)	PO_4P (PPM)	K AA (PPM)	Zn (PPM)	Mn (PPM)	Fe (PPM)	Cu (PPM)	SO_4S (PPM)
1. Blk #8 12"	35	7.7	1.25	<u>4.8</u>	3.0	4.8	0.4	3.6	2.3		+	0.3	16.1							83
2. 24"	39	7.7	1.85	6.1	<u>7.2</u>	6.0	0.4	4.2	2.1		+	0.3	42.1							110
3. 36"	44	7.8	1.68	4.6	<u>6.5</u>	6.4	0.3	3.9	2.7		++	0.2	37.0							94
OPTIMUM RANGES		6.0-7.5	<4.00 >0.60	(Ca > Mg + Na)			>0.4	<10	<5			>0.2 <1.5		>12.0	>150	>2.0	>5.0	>8.0	>1.0	>50

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SOIL ANALYSIS

Client: M.R.W.P.C.A.
#5 HARRIS COURT, Bldg D
MONTEREY, CALIFORNIA 93940-5756

Lab No.: 11-14S342 PO #004430
Sampled Date:
Submitted Date: 11-14-08
Report Date: 12-04-08
Submitted By: WILLIAM FRANKS

Material: SOIL -
RANCH: KNIGHT RANCH - CONTROL SITE #3

DESCRIPTION	% SP	pH	EC dS/m	Ca (meq/L)	Mg (meq/L)	Na (meq/L)	K (meq/L)	Cl (meq/L)	ESP	T/ac GYP REQ	LIME PRESENCE LP	B (PPM)	NO_3N (PPM)	PO_4P (PPM)	K AA (PPM)	Zn (PPM)	Mn (PPM)	Fe (PPM)	Cu (PPM)	SO_4S (PPM)
1. Blk #8 12"	53	7.7	1.39	4.6	4.4	<u>4.7</u>	0.4	3.2	2.0		+	0.3	31.7							111
2. 24"	56	7.6	1.66	5.1	<u>5.7</u>	5.4	0.3	4.0	2.1		+	0.3	23.9							133
3. 36"	65	7.7	1.38	2.9	<u>5.5</u>	5.2	0.1	2.9	2.4		+++	0.3	40.8							111
OPTIMUM RANGES		6.0-7.5	<4.00 >0.60	(Ca > Mg + Na)			>0.4	<10	<5			>0.2 <1.5		>12.0	>150	>2.0	>5.0	>8.0	>1.0	>50

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SOIL ANALYSIS

Client: M.R.W.P.C.A.
#5 HARRIS COURT, Bldg D
MONTEREY, CALIFORNIA 93940-5756

Lab No.: 04-01S009 PO #004430
Sampled Date: 03-29-09
Submitted Date: 04-01-09
Report Date: 04-08-09
Submitted By: WILLIAM FRANKS

Material: SOIL
SITE: KNIGHT RANCH - CONTROL SITE #3 - BLOCK 8

DESCRIPTION		% SP	pH	EC dS/m	Ca (meq/L)	Mg (meq/L)	Na (meq/L)	K (meq/L)	Cl (meq/L)	ESP	T/ac GYP REQ	LIME PRESENCE LP	B (PPM)	NO_3N (PPM)	SO_4S (PPM)	Mo DTPA (PPM)
1. Blk #8	12"	60	7.6	0.60	1.8	1.4	2.8	0.2	2.6	2.0		+	0.2	5.4	15	0.05
2.	24"	58	7.3	1.44	4.3	5.3	4.8	0.2	4.6	2.0		+	0.2	31.8	63	0.04
3.	36"	62	7.7	1.47	3.5	6.4	5.4	0.1	4.9	2.3		++	0.2	37.4	60	0.04
OPTIMUM RANGES			6.0-7.5	<4.00 >0.60	(Ca > Mg + Na)			>0.4	<10	<5			>0.2 <1.5		>50	

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IF YOU SHOULD HAVE ANY QUESTIONS, PLEASE CALL.

SAM MODESITT - CHEMIST

Valley Tech
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Tulare, California 93274
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SOIL ANALYSIS

Client: M.R.W.P.C.A.
#5 HARRIS COURT, Bldg D
MONTEREY, CALIFORNIA 93940-5756

Lab No.: 06-24S550 PO #004430
Sampled Date: 06-19-09
Submitted Date: 06-24-09
Report Date: 07-02-09
Submitted By: WILLIAM FRANKS

Material: SOIL
SITE: KNIGHT RANCH - CONTROL SITE #3

DESCRIPTION		% SP	pH	EC dS/m	Ca (meq/L)	Mg (meq/L)	Na (meq/L)	K (meq/L)	Cl (meq/L)	ESP	T/ac GYP REQ	LIME PRESENCE LP	B (PPM)	NO_3N (PPM)	SO_4S (PPM)	Mo DTPA (PPM)
1. Blk #8	12"	63	7.3	1.90	7.7	6.6	5.5	0.4	2.5	1.7		-	0.3	58.8	95	0.46
2.	24"	61	7.6	1.12	4.9	2.2	4.6	0.2	3.8	2.3		-	0.2	16.7	88	0.52
3.	36"	60	7.7	1.84	4.0	8.1	6.8	0.1	4.5	2.7		++++	0.3	38.8	111	0.55
OPTIMUM RANGES			6.0- 7.5	<4.00 >0.60	(Ca > Mg + Na)			>0.4	<10	<5			>0.2 <1.5		>50	

RED = LOW BLUE = HIGH DOMINANT SOLUBLE SALT IS UNDERLINED. SEE ENCLOSED INTERPRETATION GUIDES.

IF YOU SHOULD HAVE ANY QUESTIONS, PLEASE CALL.

SAM MODESITT - CHEMIST

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SOIL ANALYSIS

Client: M.R.W.P.C.A.
#5 HARRIS COURT, Bldg D
MONTEREY, CALIFORNIA 93940-5756

Lab No.: 11-25S425 PO #005131
Sampled Date: 11-23-09
Submitted Date: 11-25-09
Report Date: 12-04-09
Submitted By: WILLIAM FRANKS

Material: SOIL
SITE: KNIGHT RANCH - CONTROL SITE #3 - BLOCK 8

DESCRIPTION		% SP	pH	EC dS/m	Ca (meq/L)	Mg (meq/L)	Na (meq/L)	K (meq/L)	Cl (meq/L)	ESP	T/ac GYP REQ	LIME PRESENCE LP	B (PPM)	NO_3N (PPM)	SO_4S (PPM)	Mo DTPA (PPM)
1. Blk 8	12"	48	7.7	2.14	8.3	7.9	7.2	0.6	4.7	2.4		-	0.3	49.4	94	0.05
2.	24"	45	7.7	1.41	4.0	4.6	5.9	0.3	4.0	2.9		-	0.3	23.3	44	0.05
3.	36"	48	7.9	1.30	3.0	4.4	5.5	0.1	3.4	2.9		++++	0.2	15.7	55	0.06
OPTIMUM RANGES			6.0-7.5	<4.00 >0.60	(Ca > Mg + Na)			>0.4	<10	<5			>0.2 <1.5		>50	

RED = LOW BLUE = HIGH DOMINANT SOLUBLE SALT IS UNDERLINED. SEE ENCLOSED INTERPRETATION GUIDES.

IF YOU SHOULD HAVE ANY QUESTIONS, PLEASE CALL.

SAM MODESITT - CHEMIST

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SOIL ANALYSIS

Client: M.R.W.P.C.A.
#5 HARRIS COURT
MONTEREY, CALIFORNIA 93946

Lab No.: 04-05S045
Sampled Date: 03-30-00
Submitted Date: 04-05-00
Report Date: 04-12-00
Submitted By: GREG ANTOZ

Material: SOIL -
RANCH: SAN JON CONTROL 4

	%			------------meq/L				-------------		Tons/Acre	--------------------			PPM				--------------------
DESCRIPTION	SP	pH	EC dS/m	Ca	Mg	Na	K	Cl	ESP	GYP - LIME REQ or Presence	B	NO_3N	PO_4P	K AA	Zn	Mn	Fe	Cu	SO_4S
1. BIK 7 0-12"	43	5.3	1.12	<u>4.7</u>	2.7	3.5	0.2	1.7	1.4	-	0.4								
2. 12-24"	49	5.4	2.00	<u>7.5</u>	6.4	6.0	0.2	2.9	2.1	-	0.3								
3. 24-36"	53	7.2	2.24	<u>7.3</u>	8.6	6.3	0.1	3.2	2.0	-	0.1								
OPTIMUM RANGES		6.0-7.5	<4.00 >0.60	(Ca > Mg + Na)			>0.4	<10	<5		>0.2 <1.5		>12.0	>150	>2.0	>5.0	>8.0	>1.0	>20

RED = LOW BLUE = HIGH <u>DOMINANT SOLUBLE SALT IS UNDERLINED</u>. SEE ENCLOSED INTERPRETATION GUIDES.

IF YOU SHOULD HAVE ANY QUESTIONS, PLEASE CALL.

SAM MODESITT - CHEMIST

VT Valley Tech
AGRICULTURAL LABORATORY SERVICES

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Tulare, California 93274
Office: 559-688-5684
Fax: 559-688-5768

SOIL ANALYSIS

Client: M.R.W.P.C.A.
#5 HARRIS COURT
MONTEREY, CALIFORNIA 93946

Lab No.: 04-05S045
Sampled Date: 03-30-00
Submitted Date: 04-05-00
Report Date: 06-12-00
Submitted By: GREG ANTOZ

Material: SOIL

RANCH: SAN JON CONTROL 4

Sample Description		-PPM- NO_3N
1. Blk 7	0-12"	12.8
2.	12-24"	46.0
3.	24-36"	35.8

IF YOU SHOULD HAVE ANY QUESTIONS, PLEASE CALL.

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SOIL ANALYSIS

Client: M.R.W.P.C.A.
#5 HARRIS COURT
MONTEREY, CALIFORNIA 93946

Lab No.: 07-31S591 PO #016025
Sampled Date: 07-25-00
Submitted Date: 07-31-00
Report Date: 08-03-00
Submitted By: JEFF PARKER

Material: SOIL -

RANCH: SAN JON RANCH - CONTROL SITE #4

			%			meq/L						Tons/Acre	PPM								
DESCRIPTION			SP	pH	EC dS/m	Ca	Mg	Na	K	Cl	ESP	GYP - LIME REQ or Presence	B	NO_3N	PO_4P	K AA	Zn	Mn	Fe	Cu	SO_4S
1.	Blk #4	12"	34	6.4	2.91	13.5	6.9	8.4	0.2	3.4	2.6	-	0.2	14.5							23
2.		24"	43	5.8	1.87	6.7	5.3	6.6	0.1	2.9	2.6	-	0.4	13.1							27
3.		36"	54	7.4	2.01	4.4	5.3	10.2	0.1	4.4	5.3	-	0.4	12.0							23
OPTIMUM RANGES				6.0- 7.5	<4.00 >0.60	(Ca > Mg + Na)			>0.4	<10	<5		>0.2 <1.5		>12.0	>150	>2.0	>5.0	>8.0	>1.0	>20

RED = LOW BLUE = HIGH DOMINANT SOLUBLE SALT IS UNDERLINED. SEE ENCLOSED INTERPRETATION GUIDES.

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SOIL ANALYSIS

Client: M.R.W.P.C.A.
#5 HARRIS COURT
MONTEREY, CALIFORNIA 93946

Lab No.: 10-20S382 PO #016025
Sampled Date: 10-17-00
Submitted Date: 10-20-00
Report Date: 10-25-00
Submitted By: JEFF PARKER

Material: SOIL -
RANCH: SAN JON RANCH - CONTROL SITE #4

DESCRIPTION	% SP	pH	EC dS/m	Ca (meq/L)	Mg (meq/L)	Na (meq/L)	K (meq/L)	Cl (meq/L)	ESP	GYP - LIME (Tons/Acre, REQ or Presence)	B (PPM)	NO_3N (PPM)	PO_4P (PPM)	K AA (PPM)	Zn (PPM)	Mn (PPM)	Fe (PPM)	Cu (PPM)	SO_4S (PPM)
1. Blk #7 12"	34	5.2	3.93	<u>21.9</u>	10.2	6.7	0.5	2.4	1.2	-	0.3	135.8							22
2. 24"	37	5.5	2.85	<u>13.2</u>	9.0	6.2	0.1	2.1	1.5	-	0.1	60.4							18
3. 36"	47	6.7	1.97	5.2	<u>7.4</u>	7.0	0.1	2.8	2.8	-	0.2	42.5							18
OPTIMUM RANGES		6.0-7.5	<4.00 >0.60	(Ca > Mg + Na)			>0.4	<10	<5		>0.2 <1.5		>12.0	>150	>2.0	>5.0	>8.0	>1.0	>20

RED = LOW BLUE = HIGH <u>DOMINANT SOLUBLE SALT IS UNDERLINED</u>. SEE ENCLOSED INTERPRETATION GUIDES.

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SOIL ANALYSIS

Client: M.R.W.P.C.A.
#5 HARRIS COURT
MONTEREY, CALIFORNIA 93946

Lab No.: 03-23S235 PO #016025
Sampled Date: 03-19-01
Submitted Date: 03-23-01
Report Date: 03-28-01
Submitted By: WILLIAM FRANKS

Material: SOIL -
RANCH: SAN JON RANCH - CONTROL SITE #4

DESCRIPTION		% SP	pH	EC dS/m	Ca (meq/L)	Mg (meq/L)	Na (meq/L)	K (meq/L)	Cl (meq/L)	ESP	GYP REQ (Tons/Acre)	LIME Presence (Tons/Acre)	B (PPM)	NO_3N (PPM)	PO_4P (PPM)	K AA (PPM)	Zn (PPM)	Mn (PPM)	Fe (PPM)	Cu (PPM)	SO_4S (PPM)
1. Blk 7	12"	47	6.5	1.28	6.2	2.8	3.5	0.2	1.4	1.1		-	0.1	16.1							18
2.	24"	40	5.8	2.00	9.5	5.6	4.7	0.1	1.8	1.3		-	0.1	19.1							20
3.	36"	63	6.1	1.69	5.6	6.2	5.0	0.1	1.9	1.8		-	0.1	19.8							18
OPTIMUM RANGES			6.0-7.5	<4.00 >0.60	(Ca > Mg + Na)			>0.4	<10	<5			>0.2 <1.5		>12.0	>150	>2.0	>5.0	>8.0	>1.0	>20

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SOIL ANALYSIS

Client: M.R.W.P.C.A.
#5 HARRIS COURT
MONTEREY, CALIFORNIA 93946

Lab No.: 07-19S460 PO #016025
Sampled Date: 07-17-01
Submitted Date: 07-19-01
Report Date: 07-26-01
Submitted By:

Material: SOIL -

RANCH: SAN JON RANCH - CONTROL SITE #4

DESCRIPTION		% SP	pH	EC dS/m	Ca (meq/L)	Mg (meq/L)	Na (meq/L)	K (meq/L)	Cl (meq/L)	ESP	GYP (Tons/Acre REQ)	LIME (Presence)	B (PPM)	NO_3N (PPM)	PO_4P (PPM)	K AA (PPM)	Zn (PPM)	Mn (PPM)	Fe (PPM)	Cu (PPM)	SO_4S (PPM)
1. Blk 7	12'	36	4.8	2.33	<u>11.5</u>	6.0	5.4	0.4	1.7	1.4		-	0.4	68.2							27
2.	24"	37	4.9	3.51	<u>18.1</u>	10.6	6.2	0.3	2.2	1.1		-	0.3	72.3							37
3.	36"	48	6.1	3.77	<u>14.5</u>	15.0	8.0	0.2	3.5	1.8		-	0.2	68.3							25
OPTIMUM RANGES			6.0-7.5	<4.00 >0.60	(Ca > Mg + Na)			>0.4	<10	<5			>0.2 <1.5		>12.0	>150	>2.0	>5.0	>8.0	>1.0	>20

RED = LOW BLUE = HIGH <u>DOMINANT SOLUBLE SALT IS UNDERLINED</u>. SEE ENCLOSED INTERPRETATION GUIDES.

IF YOU SHOULD HAVE ANY QUESTIONS, PLEASE CALL.

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SOIL ANALYSIS

Client: M.R.W.P.C.A.
#5 HARRIS COURT
MONTEREY, CALIFORNIA 93946

Lab No.: 10-30S482 PO #016025
Sampled Date: 10-26-01
Submitted Date: 10-30-01
Report Date: 11-05-01
Submitted By: JEFF PARKER

Material: SOIL -
RANCH: SAN JON RANCH - CONTROL SITE #4

	%			------------meq/L	--------------					Tons/Acre	----------------	------------PPM	----------------						
DESCRIPTION	SP	pH	EC dS/m	Ca	Mg	Na	K	Cl	ESP	GYP - LIME REQ or Presence	B	NO_3N	PO_4P	K AA	Zn	Mn	Fe	Cu	SO_4S
1. Blk #7 12"	37	5.6	2.40	<u>12.1</u>	6.2	5.3	0.4	2.3	1.3	-	0.3	35.5							28
2. 24"	48	5.9	1.96	<u>8.4</u>	6.2	4.8	0.3	2.1	1.4	-	0.1	18.2							22
3. 36"	48	6.6	2.40	<u>8.6</u>	8.5	6.6	0.3	2.9	2.0	-	0.1	32.5							23
OPTIMUM RANGES		6.0- 7.5	<4.00 >0.60	(Ca > Mg + Na)			>0.4	<10	<5		>0.2 <1.5		>12.0	>150	>2.0	>5.0	>8.0	>1.0	>20

RED = LOW BLUE = HIGH <u>DOMINANT SOLUBLE SALT IS UNDERLINED</u>. SEE ENCLOSED INTERPRETATION GUIDES.

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SOIL ANALYSIS

Client: M.R.W.P.C.A.
#5 HARRIS COURT
MONTEREY, CALIFORNIA 93946

Lab No.: 03-18S184 PO #016025
Sampled Date: 03-14-02
Submitted Date: 03-18-02
Report Date: 04-02-02
Submitted By:

Material: SOIL -

RANCH: SAN JON RANCH - CONTROL SITE #4

DESCRIPTION	% SP	pH	EC dS/m	------meq/L------ Ca	Mg	Na	K	Cl	ESP	Tons/Acre GYP	LIME (REQ or Presence)	------PPM------ B	NO_3N	PO_4P	K (AA)	Zn	Mn	Fe	Cu	SO_4S
1. Blk #7 12"	39	6.6	1.66	<u>8.0</u>	4.3	4.1	0.2	2.2	1.2		-	0.2	15.6							18
2. 24"	39	6.1	2.05	<u>9.0</u>	6.4	5.0	0.2	2.8	1.4		-	0.2	23.9							20
3. 36"	47	6.5	2.27	<u>7.1</u>	8.9	6.5	0.1	3.2	2.1		-	0.1	23.6							16
OPTIMUM RANGES		6.0-7.5	<4.00 >0.60	(Ca > Mg + Na)			>0.4	<10	<5			>0.2 <1.5		>12.0	>150	>2.0	>5.0	>8.0	>1.0	>20

RED = LOW BLUE = HIGH <u>DOMINANT SOLUBLE SALT IS UNDERLINED</u>. SEE ENCLOSED INTERPRETATION GUIDES.

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SOIL ANALYSIS

Client: M.R.W.P.C.A.
#5 HARRIS COURT, Bldg D
MONTEREY, CALIFORNIA 93940-5756

Material: SOIL -

Lab No.: 08-19S327 PO #000664
Sampled Date: 08-15-02
Submitted Date: 08-19-02
Report Date: 08-23-02
Submitted By: WILLIAM FRANKS

RANCH: SAN JON RANCH - CONTROL SITE #4

	%			------------	meq/L	------------				Tons/Acre		------------	------------	------------	PPM	------------	------------	------------	------------	------------
DESCRIPTION	SP	pH	EC dS/m	Ca	Mg	Na	K	Cl	ESP	GYP REQ or Presence	LIME	B	NO_3N	PO_4P	K AA	Zn	Mn	Fe	Cu	SO_4S
1. Blk #7 12"	44	6.1	2.04	<u>9.3</u>	5.3	5.6	0.2	2.7	1.8		-	0.2	15.4	61.7						25
2. 24"	45	6.1	2.75	<u>12.4</u>	8.8	6.1	0.1	4.2	1.5		-	0.1	17.2	11.2						24
3. 36"	54	6.3	2.92	11.0	<u>11.9</u>	6.1	0.2	3.2	1.4		-	0.1	19.5	3.3						23
OPTIMUM RANGES		6.0-7.5	<4.00 >0.60	(Ca > Mg + Na)			>0.4	<10	<5			>0.2 <1.5		>12.0	>150	>2.0	>5.0	>8.0	>1.0	>20

RED = LOW BLUE = HIGH <u>DOMINANT SOLUBLE SALT IS UNDERLINED</u>. SEE ENCLOSED INTERPRETATION GUIDES.

IF YOU SHOULD HAVE ANY QUESTIONS, PLEASE CALL.

SAM MODESITT - CHEMIST

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SOIL ANALYSIS

Client: M.R.W.P.C.A.
#5 HARRIS COURT, Bldg D
MONTEREY, CALIFORNIA 93940-5756

Lab No.: 11-26S298 PO #000664
Sampled Date: 11-22-02
Submitted Date: 11-26-02
Report Date: 12-09-02
Submitted By: WILLIAM FRANKS

Material: SOIL -
RANCH: SAN JON RANCH - CONTROL SITE #4

	%			------------meq/L	-------------					Tons/Acre	------------------------------	PPM	------------------------------						
DESCRIPTION	SP	pH	EC dS/m	Ca	Mg	Na	K	Cl	ESP	GYP - LIME REQ or Presence	B	NO_3N	PO_4P	K AA	Zn	Mn	Fe	Cu	SO_4S
1. Blk #7 12"	45	5.8	3.77	19.3	11.0	7.0	0.4	5.5	1.4	-	0.3	103.9							36
2. 24"	50	5.6	2.33	9.5	8.0	5.6	0.1	4.5	1.5	-	0.2	43.9							19
3. 36"	49	5.9	2.25	10.2	7.3	4.8	0.1	4.1	1.1	-	0.1	29.4							22
OPTIMUM RANGES		6.0- 7.5	<4.00 >0.60	(Ca > Mg + Na)			>0.4	<10	<5		>0.2 <1.5		>12.0	>150	>2.0	>5.0	>8.0	>1.0	>20

RED = LOW BLUE = HIGH DOMINANT SOLUBLE SALT IS UNDERLINED. SEE ENCLOSED INTERPRETATION GUIDES.

IF YOU SHOULD HAVE ANY QUESTIONS, PLEASE CALL.

SAM MODESITT - CHEMIST

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SOIL ANALYSIS

Client: M.R.W.P.C.A.
#5 HARRIS COURT, Bldg D
MONTEREY, CALIFORNIA 93940-5756

Lab No.: 04-15S253 PO #000664
Sampled Date: 04-10-03
Submitted Date: 04-15-03
Report Date: 04-23-03
Submitted By: WILLIAM FRANKS

Material: SOIL -
RANCH: SAN JON RANCH - CONTROL SITE #4

DESCRIPTION	% SP	pH	EC dS/m	Ca (meq/L)	Mg (meq/L)	Na (meq/L)	K (meq/L)	Cl (meq/L)	ESP	T/ac GYP REQ	LIME PRESENCE LP	B (PPM)	NO_3N (PPM)	PO_4P (PPM)	K AA (PPM)	Zn (PPM)	Mn (PPM)	Fe (PPM)	Cu (PPM)	SO_4S (PPM)
1. Blk #7 12"	48	7.0	2.09	9.4	5.4	6.0	0.2	14.7	1.9		-	0.2	26.8							21
2. 24"	44	5.7	2.91	13.3	8.5	7.3	0.1	15.2	2.0		-	0.2	51.9							28
3. 36"	58	6.4	3.85	14.8	13.8	9.9	0.1	18.6	2.5		-	0.2	33.5							34
OPTIMUM RANGES		6.0-7.5	<4.00 >0.60	(Ca > Mg + Na)			>0.4	<10	<5			>0.2 <1.5		>12.0	>150	>2.0	>5.0	>8.0	>1.0	>20

RED = LOW BLUE = HIGH DOMINANT SOLUBLE SALT IS UNDERLINED. SEE ENCLOSED INTERPRETATION GUIDES.

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SOIL ANALYSIS

Client: M.R.W.P.C.A.
#5 HARRIS COURT, Bldg D
MONTEREY, CALIFORNIA 93940-5756

Lab No.: 08-18S316 PO #001223
Sampled Date: 08-13-03
Submitted Date: 08-18-03
Report Date: 08-22-03
Submitted By: WILLIAM FRANKS

Material: SOIL -
RANCH: SAN JON RANCH - CONTROL SITE #4

DESCRIPTION	% SP	pH	EC dS/m	------meq/L------ Ca	Mg	Na	K	Cl	ESP	T/ac GYP REQ	LIME PRESENCE LP	------PPM------ B	NO_3N	PO_4P	K AA	Zn	Mn	Fe	Cu	SO_4S
1. Blk #7 12"	43	6.6	3.10	13.8	8.7	8.3	0.2	20.4	2.3		-	0.2	39.1							30
2. 24"	46	5.9	3.58	16.6	10.8	8.2	0.2	29.6	2.0		-	0.2	47.2							29
3. 36"	53	6.6	4.18	15.7	17.8	8.2	0.1	32.5	1.7		-	0.1	45.1							28
OPTIMUM RANGES		6.0- 7.5	<4.00 >0.60	(Ca > Mg + Na)			>0.4	<10	<5			>0.2 <1.5		>12.0	>150	>2.0	>5.0	>8.0	>1.0	>20

RED = LOW BLUE = HIGH DOMINANT SOLUBLE SALT IS UNDERLINED. SEE ENCLOSED INTERPRETATION GUIDES.

IF YOU SHOULD HAVE ANY QUESTIONS, PLEASE CALL.

SAM MODESITT - CHEMIST

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SOIL ANALYSIS

Client: M.R.W.P.C.A.
#5 HARRIS COURT, Bldg D
MONTEREY, CALIFORNIA 93940-5756

Lab No.: 10-16S317 PO #001223
Sampled Date: 10-14-03
Submitted Date: 10-16-03
Report Date: 10-24-03
Submitted By:

Material: SOIL -
RANCH: SANDON RANCH - CONTROL SITE #4

DESCRIPTION	% SP	pH	EC dS/m	Ca (meq/L)	Mg (meq/L)	Na (meq/L)	K (meq/L)	Cl (meq/L)	ESP	T/ac GYP REQ	LIME PRESENCE LP	B (PPM)	NO_3N (PPM)	PO_4P (PPM)	K AA (PPM)	Zn (PPM)	Mn (PPM)	Fe (PPM)	Cu (PPM)	SO_4S (PPM)
1. Blk #7 12"	47	5.5	3.68	<u>18.0</u>	11.1	7.1	0.5	15.2	1.5		-	0.4	72.6							35
2. 24"	46	5.3	3.71	<u>17.7</u>	12.0	7.2	0.3	21.8	1.5		-	0.2	37.8							30
3. 36"	65	6.2	2.70	<u>9.7</u>	11.3	5.8	0.1	20.0	1.4		-	0.1	53.2							25
OPTIMUM RANGES		6.0- 7.5	<4.00 >0.60	(Ca > Mg + Na)			>0.4	<10	<5			>0.2 <1.5		>12.0	>150	>2.0	>5.0	>8.0	>1.0	>20

RED = LOW BLUE = HIGH DOMINANT SOLUBLE SALT IS UNDERLINED. SEE ENCLOSED INTERPRETATION GUIDES.

IF YOU SHOULD HAVE ANY QUESTIONS, PLEASE CALL.

SAM MODESITT - CHEMIST

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Tulare, California 93274
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SOIL ANALYSIS

Client: M.R.W.P.C.A.
#5 HARRIS COURT, Bldg D
MONTEREY, CALIFORNIA 93940-5756

Lab No.: 03-17S217 PO #001223
Sampled Date: 03-13-04
Submitted Date: 03-17-04
Report Date: 03-29-04
Submitted By: B. FRANKS

Material: SOIL -

RANCH: SAN JON RANCH - CONTROL SITE #4

DESCRIPTION	% SP	pH	EC dS/m	Ca (meq/L)	Mg (meq/L)	Na (meq/L)	K (meq/L)	Cl (meq/L)	ESP	T/ac GYP REQ	LIME PRESENCE LP	B (PPM)	NO_3N (PPM)	PO_4P (PPM)	K AA (PPM)	Zn (PPM)	Mn (PPM)	Fe (PPM)	Cu (PPM)	SO_4S (PPM)
1. Blk #7 12"	48	6.6	1.63	7.6	4.3	5.6	0.2	7.7	2.1		-	0.2	38.8							23
2. 24"	43	5.8	3.70	17.7	13.9	8.4	0.2	23.5	1.8		-	0.1	57.4							32
3. 36"	56	6.4	2.85	10.2	13.3	7.5	0.2	20.4	1.9		-	0.1	83.8							24
OPTIMUM RANGES		6.0-7.5	<4.00 >0.60	(Ca > Mg + Na)			>0.4	<10	<5			>0.2 <1.5		>12.0	>150	>2.0	>5.0	>8.0	>1.0	>50

RED = LOW BLUE = HIGH DOMINANT SOLUBLE SALT IS UNDERLINED. SEE ENCLOSED INTERPRETATION GUIDES.

IF YOU SHOULD HAVE ANY QUESTIONS, PLEASE CALL.

SAM MODESITT - CHEMIST

Valley Tech

AGRICULTURAL LABORATORY SERVICES

2120 South 'K' Street
Tulare, California 93274
Office: 559 - 688-5684
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SOIL ANALYSIS

Client: M.R.W.P.C.A.
#5 HARRIS COURT, Bldg D
MONTEREY, CALIFORNIA 93940-5756

Lab No.: 09-02S034 PO #001785
Sampled Date: 08-31-04
Submitted Date: 09-02-04
Report Date: 09-15-04
Submitted By:

Material: SOIL -

RANCH: SAN JON RANCH - CONTROL SITE #4

DESCRIPTION	% SP	pH	EC dS/m	Ca (meq/L)	Mg (meq/L)	Na (meq/L)	K (meq/L)	Cl (meq/L)	ESP	T/ac GYP REQ	LIME PRESENCE LP	B (PPM)	NO_3N (PPM)	PO_4P (PPM)	K AA (PPM)	Zn (PPM)	Mn (PPM)	Fe (PPM)	Cu (PPM)	SO_4S (PPM)
1. Blk #7 12"	37	6.3	1.75	7.5	4.3	7.0	0.1	12.4	2.9		-	0.2	9.7							34
2. 24"	41	5.7	3.09	14.0	9.8	9.3	0.1	27.2	2.7		-	0.1	28.9							38
3. 36"	55	6.2	2.99	12.8	12.4	7.1	0.1	26.2	1.6		-	0.1	53.8							28
OPTIMUM RANGES		6.0-7.5	<4.00 >0.60	(Ca > Mg + Na)			>0.4	<10	<5			>0.2 <1.5		>12.0	>150	>2.0	>5.0	>8.0	>1.0	>50

RED = LOW BLUE = HIGH DOMINANT SOLUBLE SALT IS UNDERLINED. SEE ENCLOSED INTERPRETATION GUIDES.

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SOIL ANALYSIS

Client: M.R.W.P.C.A.
#5 HARRIS COURT, Bldg D
MONTEREY, CALIFORNIA 93940-5756

Lab No.: 11-23S257 PO #001785
Sampled Date: 11-19-04
Submitted Date: 11-23-04
Report Date: 12-02-04
Submitted By: W. FRANKS

Material: SOIL -
RANCH: SAN JON RANCH - CONTROL SITE #4

DESCRIPTION	% SP	pH	EC dS/m	Ca (meq/L)	Mg (meq/L)	Na (meq/L)	K (meq/L)	Cl (meq/L)	ESP	T/ac GYP REQ	LIME PRESENCE LP	B (PPM)	NO_3N (PPM)	PO_4P (PPM)	K AA (PPM)	Zn (PPM)	Mn (PPM)	Fe (PPM)	Cu (PPM)	SO_4S (PPM)
1. Blk #7 12"	45	6.8	1.25	<u>6.3</u>	2.5	4.3	0.1	6.8	1.7		-	0.1	18.1							29
2. 24"	50	6.2	2.29	<u>10.9</u>	5.9	6.2	0.1	14.6	1.9		-	0.1	49.6							31
3. 36"	61	6.5	2.21	<u>7.8</u>	7.3	6.6	0.1	17.1	2.2		-	0.1	61.1							21
OPTIMUM RANGES		6.0- 7.5	<4.00 >0.60	(Ca > Mg + Na)			>0.4	<10	<5			>0.2 <1.5		>12.0	>150	>2.0	>5.0	>8.0	>1.0	>50

RED = LOW BLUE = HIGH <u>DOMINANT SOLUBLE SALT IS UNDERLINED</u>. SEE ENCLOSED INTERPRETATION GUIDES.

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SOIL ANALYSIS

Client: M.R.W.P.C.A.
#5 HARRIS COURT, Bldg D
MONTEREY, CALIFORNIA 93940-5756

Lab No.: 04-28S557 PO #001785
Sampled Date: 04-26-05
Submitted Date: 04-28-05
Report Date: 05-10-05
Submitted By: WILLIAM FRANKS

Material: SOIL -

RANCH: SAN JON RANCH - CONTROL SITE #4

	%			------------	meq/L	------------				T/ac	LIME	------------	------------	------------	PPM	------------	------------	------------	------------	------------
	SP	pH	EC	Ca	Mg	Na	K	Cl	ESP	GYP	PRESENCE	B	NO_3N	PO_4P	K	Zn	Mn	Fe	Cu	SO_4S
DESCRIPTION			dS/m							REQ	LP				AA					
1. Blk #7 12"	43	6.8	1.32	<u>5.0</u>	2.5	4.4	0.2	8.5	2.0		-	0.1	7.5							35
2. 24"	43	5.8	2.28	<u>10.2</u>	5.7	7.4	0.1	16.5	2.6		-	0.1	13.4							43
3. 36"	50	6.2	2.45	<u>10.6</u>	8.2	5.9	0.1	19.7	1.5		-	0.1	31.9							34
OPTIMUM RANGES		6.0- 7.5	<4.00 >0.60	(Ca > Mg + Na)			>0.4	<10	<5			>0.2 <1.5		>12.0	>150	>2.0	>5.0	>8.0	>1.0	>50

RED = LOW BLUE = HIGH <u>DOMINANT SOLUBLE SALT IS UNDERLINED</u>. SEE ENCLOSED INTERPRETATION GUIDES.

IF YOU SHOULD HAVE ANY QUESTIONS, PLEASE CALL.

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SOIL ANALYSIS

Client: M.R.W.P.C.A.
#5 HARRIS COURT, Bldg D
MONTEREY, CALIFORNIA 93940-5756

Lab No.: 08-17S275 PO #002409
Sampled Date: 08-12-05
Submitted Date: 08-17-05
Report Date: 08-25-05
Submitted By: W. FRANKS

Material: SOIL -
RANCH: SAN JON RANCH - CONTROL SITE #4

DESCRIPTION	% SP	pH	EC dS/m	meq/L Ca	meq/L Mg	meq/L Na	meq/L K	meq/L Cl	ESP	T/ac GYP REQ	LIME PRESENCE LP	PPM B	PPM NO_3N	PPM PO_4P	PPM K AA	PPM Zn	PPM Mn	PPM Fe	PPM Cu	PPM SO_4S
1. Blk #7 12"	47	6.9	3.34	15.5	8.0	11.1	0.2	26.1	3.4		-	0.1	22.1							37
2. 24"	43	6.4	3.62	16.9	9.0	11.7	0.2	30.9	3.4		-	0.1	9.6							45
3. 36"	62	6.5	2.64	10.6	9.0	6.9	0.1	22.0	2.0		-	0.1	18.7							29
OPTIMUM RANGES		6.0- 7.5	<4.00 >0.60	(Ca > Mg + Na)			>0.4	<10	<5			>0.2 <1.5		>12.0	>150	>2.0	>5.0	>8.0	>1.0	>50

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SOIL ANALYSIS

Client: M.R.W.P.C.A.
#5 HARRIS COURT, Bldg D
MONTEREY, CALIFORNIA 93940-5756

Lab No.: 10-28S594 PO #002409
Sampled Date: 10-22-05
Submitted Date: 10-28-05
Report Date: 11-04-05
Submitted By: BILL FRANKS

Material: SOIL -

RANCH: SAN JON RANCH - CONTROL SITE #4

	%			---meq/L---						T/ac	LIME	---PPM---								
DESCRIPTION	SP	pH	EC dS/m	Ca	Mg	Na	K	Cl	ESP	GYP REQ	PRESENCE LP	B	NO_3N	PO_4P	K AA	Zn	Mn	Fe	Cu	SO_4S
1. Blk #7 12"	40	6.9	2.46	<u>12.1</u>	5.9	6.8	0.3	13.9	2.0		-	0.1	41.9							34
2. 24"	35	6.6	2.31	<u>11.2</u>	5.6	6.2	0.2	14.5	1.9		-	0.1	33.8							31
3. 36"	47	6.5	2.30	<u>9.0</u>	8.1	6.1	0.1	15.6	1.8		-	0.1	37.0							28
OPTIMUM RANGES		6.0-7.5	<4.00 >0.60	(Ca > Mg + Na)			>0.4	<10	<5			>0.2 <1.5		>12.0	>150	>2.0	>5.0	>8.0	>1.0	>50

RED = LOW BLUE = HIGH <u>DOMINANT SOLUBLE SALT IS UNDERLINED</u>. SEE ENCLOSED INTERPRETATION GUIDES.

IF YOU SHOULD HAVE ANY QUESTIONS, PLEASE CALL.

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SOIL ANALYSIS

Client: M.R.W.P.C.A.
#5 HARRIS COURT, Bldg D
MONTEREY, CALIFORNIA 93940-5756

Lab No.: 05-15S279 PO #002409
Sampled Date: 05-09-06
Submitted Date: 05-15-06
Report Date: 05-19-06
Submitted By: B. FRANKS

Material: SOIL -

RANCH: SAN JON RANCH - CONTROL SITE #4

DESCRIPTION	% SP	pH	EC dS/m	Ca (meq/L)	Mg (meq/L)	Na (meq/L)	K (meq/L)	Cl (meq/L)	ESP	T/ac GYP REQ	LIME PRESENCE LP	B (PPM)	NO_3N (PPM)	PO_4P (PPM)	K AA (PPM)	Zn (PPM)	Mn (PPM)	Fe (PPM)	Cu (PPM)	SO_4S (PPM)
1. Blk #7 12"	39.1	6.9	0.82	3.3	1.0	<u>4.3</u>	0.1	2.2	3.0		-	0.2	8.5							19
2. 24"	38.4	5.2	2.20	<u>9.5</u>	3.6	8.6	0.2	17.2	3.6		-	0.3	11.6							40
3. 36"	44.4	6.2	3.54	<u>16.9</u>	8.6	9.9	0.3	31.5	2.8		-	0.1	19.6							50
OPTIMUM RANGES		6.0- 7.5	<4.00 >0.60	(Ca > Mg + Na)			>0.4	<10	<5			>0.2 <1.5		>12.0	>150	>2.0	>5.0	>8.0	>1.0	>50

RED = LOW BLUE = HIGH <u>DOMINANT SOLUBLE SALT IS UNDERLINED</u>. SEE ENCLOSED INTERPRETATION GUIDES.

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SOIL ANALYSIS

Client: M.R.W.P.C.A.
#5 HARRIS COURT, Bldg D
MONTEREY, CALIFORNIA 93940-5756

Lab No.: 08-28S423 PO #002409
Sampled Date: 08-23-06
Submitted Date: 08-28-06
Report Date: 09-05-06
Submitted By: W. FRANKS

Material: SOIL -
RANCH: SAN JON RANCH - CONTROL SITE #4

DESCRIPTION	% SP	pH	EC dS/m	Ca (meq/L)	Mg (meq/L)	Na (meq/L)	K (meq/L)	Cl (meq/L)	ESP	T/ac GYP REQ	LIME PRESENCE LP	B (PPM)	NO_3N (PPM)	PO_4P (PPM)	K AA (PPM)	Zn (PPM)	Mn (PPM)	Fe (PPM)	Cu (PPM)	SO_4S (PPM)
1. Blk #7 12"	48	6.6	2.97	<u>15.4</u>	5.2	10.0	0.2	13.4	3.2		-	0.2	20.5							195
2. 24"	44	6.0	2.63	<u>13.4</u>	5.2	7.9	0.1	17.4	2.5		-	0.1	24.8							91
3. 36"	55	6.7	2.13	<u>9.7</u>	4.5	6.6	0.1	16.5	2.4		-	0.1	25.2							52
OPTIMUM RANGES		6.0- 7.5	<4.00 >0.60	(Ca > Mg + Na)			>0.4	<10	<5			>0.2 <1.5		>12.0	>150	>2.0	>5.0	>8.0	>1.0	>50

RED = LOW BLUE = HIGH <u>DOMINANT SOLUBLE SALT IS UNDERLINED</u>. SEE ENCLOSED INTERPRETATION GUIDES.

IF YOU SHOULD HAVE ANY QUESTIONS, PLEASE CALL.

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SOIL ANALYSIS

Client: M.R.W.P.C.A.
#5 HARRIS COURT, Bldg D
MONTEREY, CALIFORNIA 93940-5756

Lab No.: 11-15S192 PO #002409
Sampled Date: 11-09-06
Submitted Date: 11-15-06
Report Date: 12-05-06
Submitted By: WILLIAM FRANKS

Material: SOIL -

RANCH: SAN JON RANCH - CONTROL SITE #4

DESCRIPTION	% SP	pH	EC dS/m	Ca (meq/L)	Mg (meq/L)	Na (meq/L)	K (meq/L)	Cl (meq/L)	ESP	T/ac GYP REQ	LIME PRESENCE LP	B (PPM)	NO_3N (PPM)	PO_4P (PPM)	K AA (PPM)	Zn (PPM)	Mn (PPM)	Fe (PPM)	Cu (PPM)	SO_4S (PPM)
1. Blk #7 12"	52	6.7	3.93	24.2	7.1	7.7	0.3	15.2	1.6		-	0.3	47.6							229
2. 24"	45	5.2	3.08	17.6	6.0	7.3	0.1	15.6	1.8		-	0.3	39.0							137
3. 36"	60	6.5	2.07	9.5	4.9	6.1	0.1	12.5	2.0		-	0.1	38.1							63
OPTIMUM RANGES		6.0- 7.5	<4.00 >0.60	(Ca > Mg + Na)			>0.4	<10	<5			>0.2 <1.5		>12.0	>150	>2.0	>5.0	>8.0	>1.0	>50

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SOIL ANALYSIS

Client: M.R.W.P.C.A.
#5 HARRIS COURT, Bldg D
MONTEREY, CALIFORNIA 93940-5756

Lab No.: 05-03S087 PO #002409
Sampled Date: 04-26-07
Submitted Date: 05-03-07
Report Date: 05-14-07
Submitted By: WILLIAM FRANK

Material: SOIL -
RANCH: SAN JON RANCH - CONTROL SITE #4

DESCRIPTION	% SP	pH	EC dS/m	Ca (meq/L)	Mg (meq/L)	Na (meq/L)	K (meq/L)	Cl (meq/L)	ESP	T/ac GYP REQ	LIME PRESENCE LP	B (PPM)	NO_3N (PPM)	PO_4P (PPM)	K AA (PPM)	Zn (PPM)	Mn (PPM)	Fe (PPM)	Cu (PPM)	SO_4S (PPM)
1. Blk #7 12"	45	6.5	3.40	19.4	8.8	6.8	0.3	13.7	1.4		-	0.3	29.7							213
2. 24"	41	6.8	3.25	19.5	9.9	7.0	0.2	1.8	1.4		-	0.1	31.0							170
3. 36"	51	6.7	2.45	10.6	8.4	6.3	0.2	15.7	1.7		-	0.1	37.7							84
OPTIMUM RANGES		6.0-7.5	<4.00 >0.60	(Ca > Mg + Na)			>0.4	<10	<5			>0.2 <1.5		>12.0	>150	>2.0	>5.0	>8.0	>1.0	>50

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SOIL ANALYSIS

Client: M.R.W.P.C.A.
#5 HARRIS COURT, Bldg D
MONTEREY, CALIFORNIA 93940-5756

Lab No.: 08-30S537 PO #002409
Sampled Date: 08-22-07
Submitted Date: 08-30-07
Report Date: 09-07-07
Submitted By: WILLIAM FRANKS

Material: SOIL -
RANCH: SAN JON RANCH - CONTROL SITE #4

DESCRIPTION	% SP	pH	EC dS/m	Ca (meq/L)	Mg (meq/L)	Na (meq/L)	K (meq/L)	Cl (meq/L)	ESP	T/ac GYP REQ	LIME PRESENCE LP	B (PPM)	NO_3N (PPM)	PO_4P (PPM)	K AA (PPM)	Zn (PPM)	Mn (PPM)	Fe (PPM)	Cu (PPM)	SO_4S (PPM)
1. Blk #7 12"	46	6.2	5.79	<u>30.2</u>	15.0	13.4	0.3	31.7	2.8		-	0.2	29.3							303
2. 24"	40	6.0	4.92	<u>24.4</u>	14.5	11.0	0.2	31.0	2.4		-	0.1	50.8							171
3. 36"	58	6.5	3.08	<u>13.2</u>	10.9	7.4	0.2	21.9	1.8		-	0.1	44.7							73
OPTIMUM RANGES		6.0-7.5	<4.00 >0.60	(Ca > Mg + Na)			>0.4	<10	<5			>0.2 <1.5		>12.0	>150	>2.0	>5.0	>8.0	>1.0	>50

RED = LOW BLUE = HIGH <u>DOMINANT SOLUBLE SALT IS UNDERLINED</u>. SEE ENCLOSED INTERPRETATION GUIDES.

IF YOU SHOULD HAVE ANY QUESTIONS, PLEASE CALL.

SAM MODESITT - CHEMIST

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SOIL ANALYSIS

Client: M.R.W.P.C.A.
#5 HARRIS COURT, Bldg D
MONTEREY, CALIFORNIA 93940-5756

Lab No.: 10-25S634 PO #003859
Sampled Date: 10-23-07
Submitted Date: 10-25-07
Report Date: 11-13-07
Submitted By: W. FRANKS

Material: SOIL -

RANCH: SAN JON RANCH - CONTROL SITE #4

DESCRIPTION		% SP	pH	EC dS/m	Ca (meq/L)	Mg (meq/L)	Na (meq/L)	K (meq/L)	Cl (meq/L)	ESP	T/ac GYP REQ	LIME PRESENCE LP	B (PPM)	NO_3N (PPM)	PO_4P (PPM)	K AA (PPM)	Zn (PPM)	Mn (PPM)	Fe (PPM)	Cu (PPM)	SO_4S (PPM)
1. Site #4	12"	38	6.9	3.00	19.4	8.6	8.6	0.4	15.0	2.1		-	0.2	35.0							191
2.	24"	40	6.0	3.51	22.6	11.6	8.8	0.2	21.3	1.8		-	0.2	53.8							163
3.	36"	51	7.0	2.45	13.5	9.8	6.8	0.1	16.8	1.7		-	0.1	31.9							109
OPTIMUM RANGES			6.0-7.5	<4.00 >0.60	(Ca > Mg + Na)			>0.4	<10	<5			>0.2 <1.5		>12.0	>150	>2.0	>5.0	>8.0	>1.0	>50

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IF YOU SHOULD HAVE ANY QUESTIONS, PLEASE CALL.

SAM MODESITT - CHEMIST

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SOIL ANALYSIS

Client: M.R.W.P.C.A.
#5 HARRIS COURT, Bldg D
MONTEREY, CALIFORNIA 93940-5756

Lab No.: 03-18S202 PO #003859
Sampled Date: 03-11-08
Submitted Date: 03-18-08
Report Date: 03-28-08
Submitted By: WILLIAM FRANKS

Material: SOIL -

RANCH: SAN JON RANCH - CONTROL SITE #4

DESCRIPTION	% SP	pH	EC dS/m	Ca (meq/L)	Mg (meq/L)	Na (meq/L)	K (meq/L)	Cl (meq/L)	ESP	T/ac GYP REQ	LIME PRESENCE LP	B (PPM)	NO_3N (PPM)	PO_4P (PPM)	K AA (PPM)	Zn (PPM)	Mn (PPM)	Fe (PPM)	Cu (PPM)	SO_4S (PPM)
1. Blk #7 12"	40	6.7	2.98	17.2	7.2	6.2	0.4	4.5	1.3		-	0.2	64.4							165
2. 24"	40	5.7	4.16	22.5	11.0	10.0	0.3	19.1	2.3		-	0.2	65.7							170
3. 36"	52	6.6	3.73	17.4	12.5	8.2	0.2	19.9	1.8		-	0.1	57.7							125
OPTIMUM RANGES		6.0-7.5	<4.00 >0.60	(Ca > Mg + Na)			>0.4	<10	<5			>0.2 <1.5		>12.0	>150	>2.0	>5.0	>8.0	>1.0	>50

RED = LOW BLUE = HIGH DOMINANT SOLUBLE SALT IS UNDERLINED. SEE ENCLOSED INTERPRETATION GUIDES.

IF YOU SHOULD HAVE ANY QUESTIONS, PLEASE CALL.

SAM MODESITT - CHEMIST

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SOIL ANALYSIS

Client: M.R.W.P.C.A.
#5 HARRIS COURT, Bldg D
MONTEREY, CALIFORNIA 93940-5756

Lab No.: 07-31S737 PO #004430
Sampled Date: 07-29-08
Submitted Date: 07-31-08
Report Date: 08-11-08
Submitted By: WILLIAM FRANKS

Material: SOIL -
RANCH: SAN JON - CONTROL SITE #4

	%			------------	meq/L	------------				T/ac	LIME	----------	----------	----------	PPM	----------	----------	----------	----------	----------
DESCRIPTION	SP	pH	EC dS/m	Ca	Mg	Na	K	Cl	ESP	GYP REQ	PRESENCE LP	B	NO_3N	PO_4P	K AA	Zn	Mn	Fe	Cu	SO_4S
1. Blk #7 12"	30	6.9	5.63	27.0	13.1	17.0	0.3	35.7	4.2		-	0.1	20.2							191
2. 24"	30	6.1	5.76	29.9	15.6	14.9	0.3	35.2	3.2		-	0.1	20.6							234
3. 36"	36	6.6	3.72	16.4	11.7	10.9	0.2	23.6	2.9		-	0.1	37.5							124
OPTIMUM RANGES		6.0-7.5	<4.00 >0.60	(Ca > Mg + Na)			>0.4	<10	<5			>0.2 <1.5		>12.0	>150	>2.0	>5.0	>8.0	>1.0	>50

RED = LOW BLUE = HIGH DOMINANT SOLUBLE SALT IS UNDERLINED. SEE ENCLOSED INTERPRETATION GUIDES.

IF YOU SHOULD HAVE ANY QUESTIONS, PLEASE CALL.

SAM MODESITT - CHEMIST

Valley Tech
AGRICULTURAL LABORATORY SERVICES

2120 South 'K' Street
Tulare, California 93274
Office: 559 - 688-5684
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SOIL ANALYSIS

Client: M.R.W.P.C.A.
#5 HARRIS COURT, Bldg D
MONTEREY, CALIFORNIA 93940-5756

Lab No.: 11-19S368 PO #004430
Sampled Date:
Submitted Date: 11-19-08
Report Date: 12-04-08
Submitted By: WILLIAM FRANKS

Material: SOIL -
RANCH: SAN JON RANCH - CONTROL SITE #4

DESCRIPTION	% SP	pH	EC dS/m	Ca (meq/L)	Mg (meq/L)	Na (meq/L)	K (meq/L)	Cl (meq/L)	ESP	T/ac GYP REQ	LIME PRESENCE LP	B (PPM)	NO_3N (PPM)	PO_4P (PPM)	K AA (PPM)	Zn (PPM)	Mn (PPM)	Fe (PPM)	Cu (PPM)	SO_4S (PPM)
1. Blk #7 12"	41	6.7	4.24	21.2	10.0	12.3	0.4	24.4	3.2		-	0.2	51.0							339
2. 24"	38	5.9	3.50	17.4	9.2	8.7	0.3	19.5	2.2		-	0.3	31.9							280
3. 36"	42	6.1	3.07	13.2	10.0	7.3	0.1	18.5	1.8		-	0.1	43.6							245
OPTIMUM RANGES		6.0-7.5	<4.00 >0.60	(Ca > Mg + Na)			>0.4	<10	<5			>0.2 <1.5		>12.0	>150	>2.0	>5.0	>8.0	>1.0	>50

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SOIL ANALYSIS

Client: M.R.W.P.C.A.
#5 HARRIS COURT, Bldg D
MONTEREY, CALIFORNIA 93940-5756

Lab No.: 03-31S341 PO #004430
Sampled Date: 03-26-09
Submitted Date: 03-31-09
Report Date: 04-08-09
Submitted By: WILLIAM FRANKS

Material: SOIL

control
SITE: SAN JON RANCH ~~TEST~~ SITE #4 - BLOCK 7

DESCRIPTION	% SP	pH	EC dS/m	Ca (meq/L)	Mg (meq/L)	Na (meq/L)	K (meq/L)	Cl (meq/L)	ESP	T/ac GYP REQ	LIME PRESENCE LP	B (PPM)	NO_3N (PPM)	SO_4S (PPM)	Mo DTPA (PPM)
1. Blk #7 12"	46	7.1	1.28	<u>5.7</u>	2.3	5.4	0.2	1.5	2.7		-	0.2	18.0	47	<0.04
2. 24"	40	7.3	2.66	<u>13.1</u>	5.6	8.3	0.2	11.1	2.7		-	0.1	38.9	84	<0.04
3. 36"	44	7.0	3.10	<u>13.4</u>	10.2	8.0	0.2	23.4	2.1		-	0.1	37.1	71	<0.04
OPTIMUM RANGES		6.0-7.5	<4.00 >0.60	(Ca > Mg + Na)			>0.4	<10	<5			>0.2 <1.5		>50	

RED = LOW BLUE = HIGH <u>DOMINANT SOLUBLE SALT IS UNDERLINED</u>. SEE ENCLOSED INTERPRETATION GUIDES.

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SOIL ANALYSIS

Client: M.R.W.P.C.A.
#5 HARRIS COURT, Bldg D
MONTEREY, CALIFORNIA 93940-5756

Lab No.: 11-03S072 PO #005131
Sampled Date: 11-03-09
Submitted Date: 11-03-09
Report Date: 11-18-09
Submitted By: WILLIAM FRANKS

Material: SOIL
SITE: SAN JON RANCH - CONTROL SITE #4 - BLOCK #7

DESCRIPTION			% SP	pH	EC dS/m	Ca (meq/L)	Mg (meq/L)	Na (meq/L)	K (meq/L)	Cl (meq/L)	ESP	GYP REQ T/ac	LIME PRESENCE LP	B (PPM)	NO_3N (PPM)	SO_4S (PPM)	Mo DTPA (PPM)
1.	Blk #7	12"	33	6.4	5.54	29.8	13.1	12.4	0.4	23.8	2.6		-	0.2	106.0	86	0.26
2.		24"	33	6.7	1.87	8.7	4.0	6.2	0.1	8.0	2.3		-	0.1	22.1	52	0.21
3.		36"	39	6.6	2.11	9.5	6.4	6.1	0.1	13.5	1.9		-	0.1	24.5	66	<0.04
OPTIMUM RANGES				6.0- 7.5	<4.00 >0.60	(Ca > Mg + Na)			>0.4	<10	<5			>0.2 <1.5		>50	

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C.2: Soil Salinity Data at the Test Sites

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SOIL ANALYSIS

Client: M.R.W.P.C.A.
#5 HARRIS COURT
MONTEREY, CALIFORNIA 93946

Lab No.: 04-05S045
Sampled Date: 03-30-00
Submitted Date: 04-05-00
Report Date: 04-12-00
Submitted By: GREG ANTOZ

Material: SOIL -

RANCH: COOPER TEST 1

DESCRIPTION	% SP	pH	EC dS/m	meq/L Ca	meq/L Mg	meq/L Na	meq/L K	meq/L Cl	ESP	Tons/Acre GYP (REQ or Presence)	Tons/Acre LIME (REQ or Presence)	PPM B	PPM NO_3N	PPM PO_4P	PPM K AA	PPM Zn	PPM Mn	PPM Fe	PPM Cu	PPM SO_4S
1. BIK 12 0-12"	59	7.4	1.87	6.0	5.2	<u>6.8</u>	0.6	3.9	2.9		-	0.5								
2. 12-24"	65	7.6	2.63	7.6	7.8	<u>10.2</u>	0.7	4.9	4.0		-	0.4								
3. 24-36"	71	7.2	3.28	8.7	10.6	<u>12.9</u>	0.6	6.8	4.6		-	0.6								
OPTIMUM RANGES		6.0-7.5	<4.00 >0.60	(Ca > Mg + Na)			>0.4	<10	<5			>0.2 <1.5		>12.0	>150	>2.0	>5.0	>8.0	>1.0	>20

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IF YOU SHOULD HAVE ANY QUESTIONS, PLEASE CALL.

SAM MODESITT - CHEMIST

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SOIL ANALYSIS

Client:	M.R.W.P.C.A. #5 HARRIS COURT MONTEREY, CALIFORNIA 93946	Lab No.:	04-05S045
		Sampled Date:	03-30-00
		Submitted Date:	04-05-00
		Report Date:	06-12-00
Material:	SOIL	Submitted By:	GREG ANTOZ

RANCH: COOPER TEST 1

Sample Description		-PPM- NO_3N
1. Blk 12	0-12"	11.2
2.	12-24"	10.0
3.	24-36"	4.7

IF YOU SHOULD HAVE ANY QUESTIONS, PLEASE CALL.

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SOIL ANALYSIS

Client: M.R.W.P.C.A.
#5 HARRIS COURT
MONTEREY, CALIFORNIA 93946

Lab No.: 08-17S210 PO #016025
Sampled Date: 08-15-00
Submitted Date: 08-17-00
Report Date: 08-23-00
Submitted By: JEFF PARKER

Material: SOIL -

RANCH: COOPER RANCH - TEST SITE #1

DESCRIPTION	% SP	pH	EC dS/m	meq/L Ca	Mg	Na	K	Cl	ESP	Tons/Acre GYP - LIME (REQ or Presence)	PPM B	NO_3N	PO_4P	K (AA)	Zn	Mn	Fe	Cu	SO_4S
1. Blk #12 12"	67	7.4	2.15	7.7	6.3	7.1	0.5	1.6	2.6	-	0.6	2.2							157
2. 24"	66	7.6	3.74	11.9	12.6	12.3	0.6	3.2	3.8	-	0.6	1.7							252
3. 36"	72	7.5	3.60	9.2	13.3	13.2	0.4	2.8	4.3	-	0.5	1.5							228
OPTIMUM RANGES		6.0-7.5	<4.00 >0.60	(Ca > Mg + Na)			>0.4	<10	<5		>0.2 <1.5		>12.0	>150	>2.0	>5.0	>8.0	>1.0	>20

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IF YOU SHOULD HAVE ANY QUESTIONS, PLEASE CALL.

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SOIL ANALYSIS

Client: MRWPCA
5 HARRIS COURT, Bldg D
MONTEREY, CALIFORNIA 93940

Lab No.: 01-02S010
Sampled Date: 12-27-00
Report Date: 01-10-01

RANCH: COOPER RANCH - TEST SITE #1

Submitted By:

	%			meq/L						Tons/Acre		PPM								
	SP	pH	EC	Ca	Mg	Na	K	Cl	ESP	GYP -	LP	B	NO_3N	PO_4P	K	Zn	Mn	Fe	Cu	SO_4S
DESCRIPTION			dS/m							REQ or Presence					AA					
1. Blk #12 12"	63	7.1	4.68	<u>19.2</u>	15.1	12.4	0.2	3.4	3.0		-	0.5	47.5							288
2. 24"	74	7.3	4.25	12.7	<u>14.7</u>	13.6	1.4	3.9	4.0		-	0.5	5.7							277
3. 36"	72	7.3	2.72	6.7	9.3	<u>10.3</u>	0.9	3.2	4.0		-	0.4	3.1							162
OPTIMUM RANGES		6.0-7.5	<4.00 >0.60	Ca > 2x (Mg+Na)			>0.4	<10	<5			>0.2 <1.5		>12.0	>150	>2.0	>5.0	>8.0	>1.0	>20

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IF YOU SHOULD HAVE ANY QUESTIONS, PLEASE CALL. THANK YOU.

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SOIL ANALYSIS

Client: M.R.W.P.C.A.
#5 HARRIS COURT
MONTEREY, CALIFORNIA 93946

Lab No.: 03-15S144 PO #016025
Sampled Date: 03-12-01
Submitted Date: 03-15-01
Report Date: 03-23-01
Submitted By: WILLIAM FRANKS

Material: SOIL -
RANCH: COOPER RANCH - TEST SITE #1

DESCRIPTION		% SP	pH	EC dS/m	Ca (meq/L)	Mg (meq/L)	Na (meq/L)	K (meq/L)	Cl (meq/L)	ESP	Tons/Acre GYP - LIME REQ or Presence	B (PPM)	NO_3N (PPM)	PO_4P (PPM)	K AA (PPM)	Zn (PPM)	Mn (PPM)	Fe (PPM)	Cu (PPM)	SO_4S (PPM)
1. Blk #12	12"	58	7.2	5.66	25.1	18.0	12.3	1.3	3.2	2.6	-	0.7	82.2							841
2.	24"	68	7.3	5.02	18.7	17.1	13.4	1.0	3.9	3.3	-	0.6	70.7							564
3.	36"	72	7.5	3.81	12.5	13.2	11.8	0.5	2.5	3.5	-	0.4	5.5							522
OPTIMUM RANGES			6.0- 7.5	<4.00 >0.60	(Ca > Mg + Na)			>0.4	<10	<5		>0.2 <1.5		>12.0	>150	>2.0	>5.0	>8.0	>1.0	>20

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SOIL ANALYSIS

Client: M.R.W.P.C.A.
#5 HARRIS COURT
MONTEREY, CALIFORNIA 93946

Lab No.: 07-27S638 PO #016025
Sampled Date: 07-25-01
Submitted Date: 07-27-01
Report Date: 08-01-01
Submitted By:

Material: SOIL -

RANCH: COOPER RANCH - TEST SITE 1

	%			------------	meq/L	--------------				Tons/Acre	---------------	---------------	-------	PPM	-------	---------------	---------------	---------------
DESCRIPTION	SP	pH	EC dS/m	Ca	Mg	Na	K	Cl	ESP	GYP - LIME REQ or Presence	B	NO_3N	PO_4P	K AA	Zn	Mn	Fe	Cu	SO_4S
1. Blk 12 12"	71	7.1	4.64	<u>20.2</u>	15.3	10.1	0.8	3.4	2.2	-	0.8	62.5							459
2. 24"	69	7.4	3.79	<u>13.1</u>	13.3	11.0	0.6	3.9	3.1	-	0.7	19.6							294
3. 36"	76	7.6	2.85	7.6	10.2	<u>10.3</u>	0.4	3.5	3.7	-	0.6	3.3							211
OPTIMUM RANGES		6.0- 7.5	<4.00 >0.60	(Ca > Mg + Na)			>0.4	<10	<5		>0.2 <1.5		>12.0	>150	>2.0	>5.0	>8.0	>1.0	>20

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SOIL ANALYSIS

Client: M.R.W.P.C.A.
#5 HARRIS COURT
MONTEREY, CALIFORNIA 93946

Lab No.: 10-24S419 PO #016025
Sampled Date: 10-19-01
Submitted Date: 10-24-01
Report Date: 11-05-01
Submitted By: JEFF PARKER

Material: SOIL -
RANCH: COOPER RANCH - TEST SITE #1

DESCRIPTION	% SP	pH	EC dS/m	Ca (meq/L)	Mg (meq/L)	Na (meq/L)	K (meq/L)	Cl (meq/L)	ESP	GYP (Tons/Acre, REQ or Presence)	LIME (Tons/Acre, REQ or Presence)	B (PPM)	NO_3N (PPM)	PO_4P (PPM)	K AA (PPM)	Zn (PPM)	Mn (PPM)	Fe (PPM)	Cu (PPM)	SO_4S (PPM)
1. Blk #12 12"	56	7.3	3.41	13.9	11.1	8.4	0.6	5.7	2.2		-	0.4	28.6							235
2. 24"	52	7.5	3.08	11.0	10.1	9.2	0.5	4.5	2.8		-	0.3	22.9							189
3. 36"	60	7.4	3.03	9.2	11.3	9.3	0.4	4.1	2.9		-	0.3	11.6							200
OPTIMUM RANGES		6.0- 7.5	<4.00 >0.60	(Ca > Mg + Na)			>0.4	<10	<5			>0.2 <1.5		>12.0	>150	>2.0	>5.0	>8.0	>1.0	>20

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SOIL ANALYSIS

Client: M.R.W.P.C.A.
#5 HARRIS COURT
MONTEREY, CALIFORNIA 93946

Lab No.: 03-18S182 PO #016025
Sampled Date: 03-14-02
Submitted Date: 03-18-02
Report Date: 04-02-02
Submitted By:

Material: SOIL -
RANCH: COOPER RANCH - TEST SITE #1

DESCRIPTION	SP (%)	pH	EC dS/m	Ca (meq/L)	Mg (meq/L)	Na (meq/L)	K (meq/L)	Cl (meq/L)	ESP	GYP - LIME (Tons/Acre, REQ or Presence)	B (PPM)	NO_3N (PPM)	PO_4P (PPM)	K AA (PPM)	Zn (PPM)	Mn (PPM)	Fe (PPM)	Cu (PPM)	SO_4S (PPM)
1. Blk #12 12"	55	7.2	2.89	11.9	9.7	6.8	0.6	3.7	1.8	-	0.5	45.0							194
2. 24"	56	7.4	3.42	11.2	12.3	10.3	0.4	5.4	3.1	-	0.4	12.7							204
3. 36"	63	7.4	4.35	11.6	17.4	14.2	0.4	6.6	4.1	-	0.4	1.1							235
OPTIMUM RANGES		6.0-7.5	<4.00 >0.60	(Ca > Mg + Na)			>0.4	<10	<5		>0.2 <1.5		>12.0	>150	>2.0	>5.0	>8.0	>1.0	>20

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SAM MODESITT - CHEMIST

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SOIL ANALYSIS

Client: M.R.W.P.C.A.
#5 HARRIS COURT
MONTEREY, CALIFORNIA 93946

Lab No.: 07-09S152 PO #016025
Sampled Date: 07-03-02
Submitted Date: 07-09-02
Report Date: 07-15-02
Submitted By: WILLIAM FRANKS

Material: SOIL -
RANCH: COOPER RANCH - TEST SITE #1

	%			------------meq/L				--------------		Tons/Acre	---------------					PPM			-------------
DESCRIPTION	SP	pH	EC dS/m	Ca	Mg	Na	K	Cl	ESP	GYP - LIME REQ or Presence	B	NO_3N	PO_4P	K AA	Zn	Mn	Fe	Cu	SO_4S
1. Blk #12 12"	64	7.1	6.02	25.6	21.1	12.6	0.9	4.6	2.5	-	0.8	112.5							367
2. 24"	64	7.5	5.11	16.7	19.1	14.6	0.6	5.4	3.7	-	0.8	23.1							274
3. 36"	69	7.6	3.52	10.0	13.4	11.4	0.5	5.0	3.5	-	0.7	20.2							188
OPTIMUM RANGES		6.0-7.5	<4.00 >0.60	(Ca > Mg + Na)			>0.4	<10	<5		>0.2 <1.5		>12.0	>150	>2.0	>5.0	>8.0	>1.0	>20

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IF YOU SHOULD HAVE ANY QUESTIONS, PLEASE CALL.

SAM MODESITT - CHEMIST

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SOIL ANALYSIS

Client: M.R.W.P.C.A.
#5 HARRIS COURT, Bldg D
MONTEREY, CALIFORNIA 93940-5756

Lab No.: 11-19S195 PO #000664
Sampled Date: 11-16-02
Submitted Date: 11-19-02
Report Date: 11-26-02
Submitted By: WILLIAM FRANKS

Material: SOIL -
RANCH: COOPER RANCH - BLOCK 2 SITE #1

DESCRIPTION	% SP	pH	EC dS/m	Ca (meq/L)	Mg (meq/L)	Na (meq/L)	K (meq/L)	Cl (meq/L)	ESP	GYP (Tons/Acre REQ or Presence)	LIME (Tons/Acre REQ or Presence)	B (PPM)	NO_3N (PPM)	PO_4P (PPM)	K AA (PPM)	Zn (PPM)	Mn (PPM)	Fe (PPM)	Cu (PPM)	SO_4S (PPM)
1. B-2 S-1 12"	66	7.2	4.64	19.9	14.9	11.0	0.6	8.6	2.6		-	0.4	11.9							243
2. 24"	67	7.5	4.92	17.5	18.1	13.0	0.5	8.1	3.2		-	0.4	15.0							216
3. 36"	67	7.6	3.69	11.9	14.1	10.7	0.3	7.1	3.0		-	0.3	4.2							160
OPTIMUM RANGES		6.0- 7.5	<4.00 >0.60	(Ca > Mg + Na)			>0.4	<10	<5			>0.2 <1.5		>12.0	>150	>2.0	>5.0	>8.0	>1.0	>20

RED = LOW BLUE = HIGH DOMINANT SOLUBLE SALT IS UNDERLINED. SEE ENCLOSED INTERPRETATION GUIDES.

IF YOU SHOULD HAVE ANY QUESTIONS, PLEASE CALL.

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SOIL ANALYSIS

Client: M.R.W.P.C.A.
#5 HARRIS COURT, Bldg D
MONTEREY, CALIFORNIA 93940-5756

Lab No.: 03-21S206 PO #000664
Sampled Date: 03-19-03
Submitted Date: 03-21-03
Report Date: 04-02-03
Submitted By: WILLIAM FRANK

Material: SOIL - TEST
RANCH: COOPER RANCH - SITE #1

DESCRIPTION	% SP	pH	EC dS/m	Ca (meq/L)	Mg (meq/L)	Na (meq/L)	K (meq/L)	Cl (meq/L)	ESP	T/ac GYP REQ	LIME PRESENCE LP	B (PPM)	NO_3N (PPM)	PO_4P (PPM)	K AA (PPM)	Zn (PPM)	Mn (PPM)	Fe (PPM)	Cu (PPM)	SO_4S (PPM)
1. Blk #12 12"	77	7.4	6.57	34.5	27.8	15.8	1.7	5.4	2.8		-	0.6	76.7							670
2. 24"	63	7.3	10.25	46.1	47.1	30.4	1.4	18.4	5.0		-	0.7	19.4							964
3. 36"	84	7.4	6.13	20.2	26.2	19.1	0.8	15.2	4.4		-	0.5	6.4							457
OPTIMUM RANGES		6.0- 7.5	<4.00 >0.60	(Ca > Mg + Na)			>0.4	<10	<5			>0.2 <1.5		>12.0	>150	>2.0	>5.0	>8.0	>1.0	>20

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SOIL ANALYSIS

Client: M.R.W.P.C.A.
#5 HARRIS COURT, Bldg D
MONTEREY, CALIFORNIA 93940-5756

Material: SOIL -
RANCH: COOPER - TEST SITE #1

Lab No.: 08-04S048 PO #001223
Sampled Date: 07-31-03
Submitted Date: 08-04-03
Report Date: 08-11-03
Submitted By: WILLIAM FRANKS

DESCRIPTION	% SP	pH	EC dS/m	meq/L Ca	meq/L Mg	meq/L Na	meq/L K	meq/L Cl	ESP	T/ac GYP REQ	LIME PRESENCE LP	PPM B	PPM NO_3N	PPM PO_4P	PPM K AA	PPM Zn	PPM Mn	PPM Fe	PPM Cu	PPM SO_4S
1. Blk #12 12"	59	7.6	5.63	<u>22.2</u>	20.3	13.1	0.7	8.6	2.9		-	0.6	93.0							502
2. 24"	67	7.9	4.85	<u>16.3</u>	17.5	14.2	0.5	13.1	3.7		-	0.5	34.8							365
3. 36"	68	7.9	3.44	11.0	11.3	<u>11.7</u>	0.4	14.8	3.7		-	0.4	9.6							267
OPTIMUM RANGES		6.0-7.5	<4.00 >0.60	(Ca > Mg + Na)			>0.4	<10	<5			>0.2 <1.5		>12.0	>150	>2.0	>5.0	>8.0	>1.0	>20

RED = LOW BLUE = HIGH <u>DOMINANT SOLUBLE SALT IS UNDERLINED</u>. SEE ENCLOSED INTERPRETATION GUIDES.

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SOIL ANALYSIS

Client: M.R.W.P.C.A.
#5 HARRIS COURT, Bldg D
MONTEREY, CALIFORNIA 93940-5756

Lab No.: 11-26S268 PO #001223
Sampled Date: 11-22-03
Submitted Date: 11-26-03
Report Date: 12-05-03
Submitted By: WILLIAM FRANKS

Material: SOIL -

RANCH: COOPER RANCH - TEST SITE #1

DESCRIPTION	SP (%)	pH	EC dS/m	Ca (meq/L)	Mg (meq/L)	Na (meq/L)	K (meq/L)	Cl (meq/L)	ESP	T/ac GYP REQ	LIME PRESENCE LP	B (PPM)	NO_3N (PPM)	PO_4P (PPM)	K AA (PPM)	Zn (PPM)	Mn (PPM)	Fe (PPM)	Cu (PPM)	SO_4S (PPM)
1. Blk #12 12"	69	7.3	6.43	25.1	22.9	15.2	1.0	13.5	3.2		-	0.4	127.9							163
2. 24"	77	7.2	5.11	17.2	19.4	13.8	0.7	15.2	3.4		-	0.3	12.1							149
3. 36"	88	7.3	4.06	11.8	16.2	12.1	0.4	13.7	3.4		-	0.3	4.2							107
OPTIMUM RANGES		6.0-7.5	<4.00 >0.60	(Ca > Mg + Na)			>0.4	<10	<5			>0.2 <1.5		>12.0	>150	>2.0	>5.0	>8.0	>1.0	>20

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SOIL ANALYSIS

Client: M.R.W.P.C.A.
#5 HARRIS COURT, Bldg D
MONTEREY, CALIFORNIA 93940-5756

Lab No.: 05-11S262 PO #001223
Sampled Date: 05-05-04
Submitted Date: 05-11-04
Report Date: 05-21-04
Submitted By: WILLIAM FRANKS

Material: SOIL -

RANCH: COOPER RANCH - TEST SITE #1

DESCRIPTION	% SP	pH	EC dS/m	Ca (meq/L)	Mg (meq/L)	Na (meq/L)	K (meq/L)	Cl (meq/L)	ESP	T/ac GYP REQ	LIME PRESENCE LP	B (PPM)	NO_3N (PPM)	PO_4P (PPM)	K AA (PPM)	Zn (PPM)	Mn (PPM)	Fe (PPM)	Cu (PPM)	SO_4S (PPM)
1. Blk #1 12"	71	7.3	3.69	17.1	16.6	12.8	0.8	5.9	3.2		-	0.6	92.5							229
2. 24"	72	7.4	3.85	16.7	17.9	14.5	0.6	6.5	3.7		-	0.5	37.8							225
3. 36"	80	7.5	3.34	11.2	15.5	13.1	0.5	13.7	3.9		-	0.5	7.5							174
OPTIMUM RANGES		6.0-7.5	<4.00 >0.60	(Ca > Mg + Na)			>0.4	<10	<5			>0.2 <1.5		>12.0	>150	>2.0	>5.0	>8.0	>1.0	>50

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SOIL ANALYSIS

Client: M.R.W.P.C.A.
#5 HARRIS COURT, Bldg D
MONTEREY, CALIFORNIA 93940-5756

Lab No.: 07-20S454 PO #001785
Sampled Date: 07-16-04
Submitted Date: 07-20-04
Report Date: 07-29-04
Submitted By:

Material: SOIL -

RANCH: COOPER RANCH - SITE #1

DESCRIPTION	% SP	pH	EC dS/m	Ca (meq/L)	Mg (meq/L)	Na (meq/L)	K (meq/L)	Cl (meq/L)	ESP	T/ac GYP REQ	LIME PRESENCE LP	B (PPM)	NO_3N (PPM)	PO_4P (PPM)	K AA (PPM)	Zn (PPM)	Mn (PPM)	Fe (PPM)	Cu (PPM)	SO_4S (PPM)
1. Blk #12 12"	66	7.4	3.69	16.1	12.9	11.8	0.6	9.4	3.2		-	0.7	8.7							256
2. 24"	65	7.6	4.26	17.9	18.6	14.2	0.6	14.4	3.5		-	0.7	5.2							302
3. 36"	73	7.6	3.77	11.7	15.3	13.0	0.5	15.3	3.8		-	0.6	3.5							218
OPTIMUM RANGES		6.0-7.5	<4.00 >0.60	(Ca > Mg + Na)			>0.4	<10	<5			>0.2 <1.5		>12.0	>150	>2.0	>5.0	>8.0	>1.0	>50

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SOIL ANALYSIS

Client: M.R.W.P.C.A.
#5 HARRIS COURT, Bldg D
MONTEREY, CALIFORNIA 93940-5756

Material: SOIL -

RANCH: COOPER RANCH - TEST SITE #1

Lab No.: 11-10S102 PO #001785
Sampled Date: 11-06-04
Submitted Date: 11-10-04
Report Date: 11-19-04
Submitted By: WILLIAM FRANKS

DESCRIPTION		% SP	pH	EC dS/m	Ca (meq/L)	Mg (meq/L)	Na (meq/L)	K (meq/L)	Cl (meq/L)	ESP	T/ac GYP REQ	LIME PRESENCE LP	B (PPM)	NO_3N (PPM)	PO_4P (PPM)	K AA (PPM)	Zn (PPM)	Mn (PPM)	Fe (PPM)	Cu (PPM)	SO_4S (PPM)
1. Blk #12	12"	70	7.4	4.41	22.0	14.8	14.9	0.7	15.6	3.7		-	0.4	30.4							345
2.	24"	58	7.5	4.75	20.9	17.9	15.7	0.6	17.9	3.9		-	0.4	51.3							328
3.	36"	71	7.8	3.55	14.5	13.9	13.2	0.5	18.3	3.8		-	0.3	11.8							251
OPTIMUM RANGES			6.0- 7.5	<4.00 >0.60	(Ca > Mg + Na)			>0.4	<10	<5			>0.2 <1.5		>12.0	>150	>2.0	>5.0	>8.0	>1.0	>50

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SOIL ANALYSIS

Client: M.R.W.P.C.A.
#5 HARRIS COURT, Bldg D
MONTEREY, CALIFORNIA 93940-5756

Lab No.: 11-10S102 PO #001785
Sampled Date: 11-06-04
Submitted Date: 11-10-04
Report Date: 11-19-04
Submitted By: WILLIAM FRANKS

Material: SOIL -
RANCH: COOPER RANCH - TEST SITE #1

		%			------------meq/L	-------------					T/ac	LIME	-----------------------------	PPM							-----------
		SP	pH	EC	Ca	Mg	Na	K	Cl	ESP	GYP	PRESENCE	B	NO_3N	PO_4P	K	Zn	Mn	Fe	Cu	SO_4S
DESCRIPTION				dS/m							REQ	LP				AA					
1. Blk #12	12"	70	7.4	4.41	<u>22.0</u>	14.8	14.9	0.7	15.6	3.7		-	0.4	30.4							345
2.	24"	58	7.5	4.75	<u>20.9</u>	17.9	15.7	0.6	17.9	3.9		-	0.4	51.3							328
3.	36"	71	7.8	3.55	<u>14.5</u>	13.9	13.2	0.5	18.3	3.8		-	0.3	11.8							251
OPTIMUM RANGES			6.0-7.5	<4.00 >0.60	(Ca > Mg + Na)			>0.4	<10	<5			>0.2 <1.5		>12.0	>150	>2.0	>5.0	>8.0	>1.0	>50

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SOIL ANALYSIS

Client: M.R.W.P.C.A.
#5 HARRIS COURT, Bldg D
MONTEREY, CALIFORNIA 93940-5756

Material: SOIL -
RANCH: COOPER RANCH - TEST SITE #1

Lab No.: 06-02S058 PO #001785
Sampled Date: 05-28-05
Submitted Date: 06-02-05
Report Date: 06-10-05
Submitted By: W. FRANKS

DESCRIPTION		% SP	pH	EC dS/m	meq/L Ca	meq/L Mg	meq/L Na	meq/L K	meq/L Cl	ESP	T/ac GYP REQ	LIME PRESENCE LP	PPM B	PPM NO_3N	PPM PO_4P	PPM K AA	PPM Zn	PPM Mn	PPM Fe	PPM Cu	PPM SO_4S
1. Blk #12	12"	57	7.4	4.27	18.7	13.9	11.9	0.8	10.2	3.0		-	0.5	20.8							345
2.	24"	66	7.5	4.74	18.5	17.6	14.4	0.7	15.7	3.6		-	0.6	5.7							354
3.	36"	76	7.5	4.81	15.7	20.6	15.5	0.4	18.4	3.9		-	0.4	3.2							330
OPTIMUM RANGES			6.0-7.5	<4.00 >0.60	(Ca > Mg + Na)			>0.4	<10	<5			>0.2 <1.5		>12.0	>150	>2.0	>5.0	>8.0	>1.0	>50

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SOIL ANALYSIS

Client:	M.R.W.P.C.A. #5 HARRIS COURT, Bldg D MONTEREY, CALIFORNIA 93940-5756	Lab No.:	08-02S035 PO #002409
		Sampled Date:	07-29-05
		Submitted Date:	08-02-05
		Report Date:	08-12-05
Material:	SOIL -	Submitted By:	W. FRANKS

RANCH: COOPER RANCH - TEST SITE #1

DESCRIPTION		% SP	pH	EC dS/m	Ca (meq/L)	Mg (meq/L)	Na (meq/L)	K (meq/L)	Cl (meq/L)	ESP	T/ac GYP REQ	LIME PRESENCE LP	B (PPM)	NO_3N (PPM)	PO_4P (PPM)	K AA (PPM)	Zn (PPM)	Mn (PPM)	Fe (PPM)	Cu (PPM)	SO_4S (PPM)
1. Blk #12	12"	67	7.5	4.10	17.3	13.5	12.7	0.8	10.2	3.4		-	0.8	77.4							297
2.	24"	70	7.5	4.05	17.3	14.4	12.1	0.5	14.4	3.1		-	0.5	7.1							311
3.	36"	79	7.6	3.14	9.3	11.9	10.1	0.4	12.4	3.2		-	0.5	6.9							213
OPTIMUM RANGES			6.0- 7.5	<4.00 >0.60	(Ca > Mg + Na)			>0.4	<10	<5			>0.2 <1.5		>12.0	>150	>2.0	>5.0	>8.0	>1.0	>50

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SOIL ANALYSIS

Client: M.R.W.P.C.A.
#5 HARRIS COURT, Bldg D
MONTEREY, CALIFORNIA 93940-5756

Lab No.: 11-30S364 PO #002409
Sampled Date: 11-23-05
Submitted Date: 11-30-05
Report Date: 12-06-06
Submitted By: BILL FRANKS

Material: SOIL -

RANCH: COOPER RANCH - TEST SITE #1

DESCRIPTION	% SP	pH	EC dS/m	Ca (meq/L)	Mg (meq/L)	Na (meq/L)	K (meq/L)	Cl (meq/L)	ESP	T/ac GYP REQ	LIME PRESENCE LP	B (PPM)	NO_3N (PPM)	PO_4P (PPM)	K AA (PPM)	Zn (PPM)	Mn (PPM)	Fe (PPM)	Cu (PPM)	SO_4S (PPM)
1. Blk #12 12"	62	6.9	2.74	13.4	8.2	6.7	0.4	4.2	1.7		-	0.3	101.3							56
2. 24"	59	7.2	1.47	5.9	3.8	5.0	0.2	3.7	2.0		-	0.3	43.0							27
3. 36"	62	7.3	1.15	3.7	3.4	4.0	0.2	3.4	1.9		-	0.2	25.6							20
OPTIMUM RANGES		6.0- 7.5	<4.00 >0.60	(Ca > Mg + Na)			>0.4	<10	<5			>0.2 <1.5		>12.0	>150	>2.0	>5.0	>8.0	>1.0	>50

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SOIL ANALYSIS

Client: M.R.W.P.C.A.
#5 HARRIS COURT, Bldg D
MONTEREY, CALIFORNIA 93940-5756

Lab No.: 07-05S030 PO #002409
Sampled Date: 06-28-06
Submitted Date: 07-05-06
Report Date: 07-12-06
Submitted By: W. FRANKS

Material: SOIL -
RANCH: COOPER RANCH - TEST SITE #1

DESCRIPTION		% SP	pH	EC dS/m	Ca (meq/L)	Mg (meq/L)	Na (meq/L)	K (meq/L)	Cl (meq/L)	ESP	T/ac GYP REQ	LIME PRESENCE LP	B (PPM)	NO_3N (PPM)	PO_4P (PPM)	K AA (PPM)	Zn (PPM)	Mn (PPM)	Fe (PPM)	Cu (PPM)	SO_4S (PPM)
1. Blk #12	12"	60	7.2	3.61	16.0	7.4	14.5	0.8	12.1	4.7		-	0.7	22.7	59.7						252
2.	24"	70	7.6	3.95	16.4	7.7	14.7	0.8	12.3	4.8		-	0.6	12.0	67.6						282
3.	36"	72	7.5	4.24	14.7	13.7	16.4	0.6	17.9	4.9		-	0.6	3.4	66.8						303
OPTIMUM RANGES			6.0- 7.5	<4.00 >0.60	(Ca > Mg + Na)			>0.4	<10	<5			>0.2 <1.5		>12.0	>150	>2.0	>5.0	>8.0	>1.0	>50

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SOIL ANALYSIS

Client: M.R.W.P.C.A.
#5 HARRIS COURT, Bldg D
MONTEREY, CALIFORNIA 93940-5756

Lab No.: 11-22S267 PO #002409
Sampled Date: 11-17-06
Submitted Date: 11-22-06
Report Date: 12-05-06
Submitted By: WILLIAM FRANKS

Material: SOIL -
RANCH: COOPER RANCH - TEST SITE #1

DESCRIPTION		% SP	pH	EC dS/m	Ca (meq/L)	Mg (meq/L)	Na (meq/L)	K (meq/L)	Cl (meq/L)	ESP	T/ac GYP REQ	LIME PRESENCE LP	B (PPM)	NO_3N (PPM)	PO_4P (PPM)	K AA (PPM)	Zn (PPM)	Mn (PPM)	Fe (PPM)	Cu (PPM)	SO_4S (PPM)
1. #1	12"	74	7.4	4.55	<u>19.9</u>	10.1	15.0	0.8	9.3	4.3		-	0.6	148.3							250
2.	24"	77	7.6	3.55	<u>15.0</u>	8.3	13.4	0.6	13.4	4.3		-	0.4	17.8							318
3.	36"	80	7.7	3.49	<u>13.5</u>	9.0	13.1	0.5	15.6	4.3		-	0.4	3.2							291
OPTIMUM RANGES			6.0-7.5	<4.00 >0.60	(Ca > Mg + Na)			>0.4	<10	<5			>0.2 <1.5		>12.0	>150	>2.0	>5.0	>8.0	>1.0	>50

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IF YOU SHOULD HAVE ANY QUESTIONS, PLEASE CALL.

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SOIL ANALYSIS

Client:	M.R.W.P.C.A. #5 HARRIS COURT, Bldg D MONTEREY, CALIFORNIA 93940-5756	Lab No.:	04-03S041 PO #002409
		Sampled Date:	03-28-07
		Submitted Date:	04-03-07
		Report Date:	04-17-07
Material:	SOIL -	Submitted By:	W. FRANKS

RANCH: COOPER RANCH - TEST SITE #1

DESCRIPTION	% SP	pH	EC dS/m	Ca (meq/L)	Mg (meq/L)	Na (meq/L)	K (meq/L)	Cl (meq/L)	ESP	T/ac GYP REQ	LIME PRESENCE LP	B (PPM)	NO_3N (PPM)	PO_4P (PPM)	K AA (PPM)	Zn (PPM)	Mn (PPM)	Fe (PPM)	Cu (PPM)	SO_4S (PPM)
1. Blk #12 12"	71	7.4	4.44	17.9	14.2	13.4	0.8	9.2	3.5		-	0.5	103.7							284
2. 24"	75	7.5	5.58	21.5	20.2	17.9	0.8	19.0	4.3		-	0.4	105.7							328
3. 36"	72	7.5	4.22	12.8	16.7	12.8	0.5	15.9	3.5		-	0.3	32.2							305
OPTIMUM RANGES		6.0-7.5	<4.00 >0.60	(Ca > Mg + Na)			>0.4	<10	<5			>0.2 <1.5		>12.0	>150	>2.0	>5.0	>8.0	>1.0	>50

RED = LOW BLUE = HIGH DOMINANT SOLUBLE SALT IS UNDERLINED. SEE ENCLOSED INTERPRETATION GUIDES.

IF YOU SHOULD HAVE ANY QUESTIONS, PLEASE CALL.

SAM MODESITT - CHEMIST

Valley Tech
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Tulare, California 93274
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Fax: 559 - 688-5768

SOIL ANALYSIS

Client: M.R.W.P.C.A.
#5 HARRIS COURT, Bldg D
MONTEREY, CALIFORNIA 93940-5756

Lab No.: 05-19S475 PO #002409
Sampled Date: 05-11-07
Submitted Date: 05-19-07
Report Date: 06-01-07
Submitted By: WILLIAM FRANKS

Material: SOIL -

RANCH: COOPER RANCH - TEST SITE #1

DESCRIPTION	% SP	pH	EC dS/m	Ca	Mg	Na	K	Cl	ESP	T/ac GYP REQ	LIME PRESENCE LP	B	NO_3N	PO_4P	K AA	Zn	Mn	Fe	Cu	SO_4S
				------------meq/L	-------------							-----------	------	------	---PPM---	------	------	------	------	------
1. Blk #1: 12"	72	7.2	4.93	21.2	16.7	15.3	0.7	18.1	3.8		-	0.6	196.7							381
2. 24"	65	7.2	5.91	25.2	21.5	17.7	0.7	22.1	4.0		-	0.4	290.8							417
3. 36"	79	7.6	3.21	12.5	11.0	10.8	0.3	13.9	3.3		-	0.3	35.9							274
OPTIMUM RANGES		6.0-7.5	<4.00 >0.60	(Ca > Mg + Na)			>0.4	<10	<5			>0.2 <1.5		>12.0	>150	>2.0	>5.0	>8.0	>1.0	>50

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SOIL ANALYSIS

Client: M.R.W.P.C.A.
#5 HARRIS COURT, Bldg D
MONTEREY, CALIFORNIA 93940-5756

Lab No.: 11-09S166 PO #003859
Sampled Date: 11-03-07
Submitted Date: 11-09-07
Report Date: 11-28-07
Submitted By: WILLIAM FRANKS

Material: SOIL -

RANCH: COOPER RANCH - TEST SITE 1

DESCRIPTION	SP (%)	pH	EC dS/m	Ca (meq/L)	Mg (meq/L)	Na (meq/L)	K (meq/L)	Cl (meq/L)	ESP	GYP REQ (T/ac)	LIME PRESENCE LP	B (PPM)	NO_3N (PPM)	PO_4P (PPM)	K AA (PPM)	Zn (PPM)	Mn (PPM)	Fe (PPM)	Cu (PPM)	SO_4S (PPM)
1. Blk #12 12"	58	7.4	5.95	23.0	22.2	18.8	0.9	18.1	4.4		-	0.6	155.5							343
2. 24"	56	7.4	6.66	25.4	25.0	20.4	0.8	20.5	4.5		-	0.5	143.5							429
3. 36"	56	7.8	3.58	12.5	13.5	11.6	0.3	13.0	3.4		-	0.3	13.6							303
OPTIMUM RANGES		6.0-7.5	<4.00 >0.60	(Ca > Mg + Na)			>0.4	<10	<5			>0.2 <1.5		>12.0	>150	>2.0	>5.0	>8.0	>1.0	>50

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SAM MODESITT - CHEMIST

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SOIL ANALYSIS

Client: M.R.W.P.C.A.
#5 HARRIS COURT, Bldg D
MONTEREY, CALIFORNIA 93940-5756

Material: SOIL -

RANCH: COOPER RANCH - TEST SITE #1

Lab No.: 03-10S084 PO #003859
Sampled Date: 03-05-08
Submitted Date: 03-10-08
Report Date: 03-20-08
Submitted By: WILLIAM FRANKS

	%			------------meq/L				--------------		T/ac	LIME	-------------------------------PPM								
DESCRIPTION	SP	pH	EC dS/m	Ca	Mg	Na	K	Cl	ESP	GYP REQ	PRESENCE LP	B	NO_3N	PO_4P	K AA	Zn	Mn	Fe	Cu	SO_4S
1. Blk #12 12"	71	7.5	2.88	11.1	8.7	10.1	0.6	2.4	3.4		-	0.7	43.3							316
2. 24"	76	7.3	5.77	23.4	19.3	17.6	0.8	17.2	4.2		-	0.4	142.1							339
3. 36"	78	7.7	3.48	10.8	14.0	11.3	0.5	12.6	3.4		-	0.3	28.1							304
OPTIMUM RANGES		6.0-7.5	<4.00 >0.60	(Ca > Mg + Na)			>0.4	<10	<5			>0.2 <1.5		>12.0	>150	>2.0	>5.0	>8.0	>1.0	>50

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SOIL ANALYSIS

Client: M.R.W.P.C.A.
#5 HARRIS COURT, Bldg D
MONTEREY, CALIFORNIA 93940-5756

Lab No.: 06-04S072 PO #003859
Sampled Date: 05-30-08
Submitted Date: 06-04-08
Report Date: 06-24-08
Submitted By: WILLIAM FRANKS

Material: SOIL -
RANCH: COOPER RANCH TEST SITE #1

DESCRIPTION	% SP	pH	EC dS/m	Ca (meq/L)	Mg (meq/L)	Na (meq/L)	K (meq/L)	Cl (meq/L)	ESP	T/ac GYP REQ	LIME PRESENCE LP	B (PPM)	NO_3N (PPM)	PO_4P (PPM)	K AA (PPM)	Zn (PPM)	Mn (PPM)	Fe (PPM)	Cu (PPM)	SO_4S (PPM)
1. Blk #12 12"	75	7.2	3.76	15.0	11.5	12.5	0.8	10.4	3.7		-	1.0	135.9							266
2. 24"	77	7.3	4.09	15.1	12.5	13.8	0.8	9.3	4.0		-	1.0	113.7							339
3. 36"	82	7.5	6.07	22.4	21.6	18.4	0.8	21.3	4.3		-	0.6	64.5							519
OPTIMUM RANGES		6.0-7.5	<4.00 >0.60	(Ca > Mg + Na)			>0.4	<10	<5			>0.2 <1.5		>12.0	>150	>2.0	>5.0	>8.0	>1.0	>50

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SOIL ANALYSIS

Client: M.R.W.P.C.A.
#5 HARRIS COURT, Bldg D
MONTEREY, CALIFORNIA 93940-5756

Lab No.: 09-11S275 PO #004430
Sampled Date: 09-09-08
Submitted Date: 09-11-08
Report Date: 09-25-08
Submitted By: WILLIAM FRANKS

Material: SOIL -

RANCH: COOPER RANCH - TEST SITE #1

DESCRIPTION		% SP	pH	EC dS/m	Ca (meq/L)	Mg (meq/L)	Na (meq/L)	K (meq/L)	Cl (meq/L)	ESP	T/ac GYP REQ	LIME PRESENCE LP	B (PPM)	NO_3N (PPM)	PO_4P (PPM)	K AA (PPM)	Zn (PPM)	Mn (PPM)	Fe (PPM)	Cu (PPM)	SO_4S (PPM)
1. Blk #12	12"	54	7.4	2.52	8.8	5.7	10.8	0.5	10.4	4.5		+	0.7	11.1							153
2.	24"	46	7.5	8.98	31.1	30.6	31.2	1.2	31.1	6.6		+	0.7	73.3							514
3.	36"	58	7.6	5.16	17.0	20.0	16.5	0.6	18.9	4.2		+	0.3	17.6							370
OPTIMUM RANGES			6.0-7.5	<4.00 >0.60	(Ca > Mg + Na)			>0.4	<10	<5			>0.2 <1.5		>12.0	>150	>2.0	>5.0	>8.0	>1.0	>50

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IF YOU SHOULD HAVE ANY QUESTIONS, PLEASE CALL.

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SOIL ANALYSIS

Client: M.R.W.P.C.A.
#5 HARRIS COURT, Bldg D
MONTEREY, CALIFORNIA 93940-5756

Lab No.: 03-18S172 PO #004430
Sampled Date: 03-18-09
Submitted Date: 03-18-09
Report Date: 03-26-09
Submitted By: JESSE CHACON

Material: SOIL -
SITE: COOPER RANCH - TEST SITE #1

DESCRIPTION		% SP	pH	EC dS/m	Ca (meq/L)	Mg (meq/L)	Na (meq/L)	K (meq/L)	Cl (meq/L)	ESP	T/ac GYP REQ	LIME PRESENCE LP	B (PPM)	NO_3N (PPM)	SO_4S (PPM)	DTPA Mo
1. Blk #12	12"	67	7.4	1.54	5.4	4.0	<u>6.6</u>	0.4	3.5	3.1		-	0.7	19.9	88	0.15
2.	24"	69	7.5	2.81	11.1	7.7	<u>11.1</u>	0.3	10.0	3.9		-	0.4	53.5	138	0.20
3.	36"	75	7.5	4.00	<u>13.5</u>	14.6	13.4	0.4	14.0	3.9		-	0.4	62.1	215	<0.04
OPTIMUM RANGES			6.0-7.5	<4.00 >0.60	(Ca > Mg + Na)			>0.4	<10	<5			>0.2 <1.5		>50	

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SOIL ANALYSIS

Client: M.R.W.P.C.A.
#5 HARRIS COURT, Bldg D
MONTEREY, CALIFORNIA 93940-5756

Lab No.: 07-23S503 PO #004430
Sampled Date: 07-23-09
Submitted Date: 07-23-09
Report Date: 07-29-09
Submitted By: WILLIAM FRANKS

Material: SOIL
SITE: COOPER RANCH - TEST SITE #1 - Blk #12

DESCRIPTION		% SP	pH	EC dS/m	Ca (meq/L)	Mg (meq/L)	Na (meq/L)	K (meq/L)	Cl (meq/L)	ESP	T/ac GYP REQ	LIME PRESENCE LP	B (PPM)	NO_3N (PPM)	SO_4S (PPM)	Mo DTPA (PPM)
1. Blk 12	12"	59	7.3	3.14	11.1	7.8	<u>12.6</u>	0.7	11.2	4.6		-	1.0	26.3	173	0.17
2.	24"	76	7.5	5.45	22.4	19.5	<u>22.4</u>	1.0	19.0	5.6		-	0.9	43.2	349	0.15
3.	36"	68	7.6	3.53	18.5	<u>24.3</u>	23.0	4.7	23.1	5.7		-	0.4	12.1	380	0.33
OPTIMUM RANGES			6.0-7.5	<4.00 >0.60	(Ca > Mg + Na)			>0.4	<10	<5			>0.2 <1.5		>50	

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SOIL ANALYSIS

Client: M.R.W.P.C.A.
#5 HARRIS COURT, Bldg D
MONTEREY, CALIFORNIA 93940-5756

Lab No.: 11-06S173 PO #005131
Sampled Date: 11-04-09
Submitted Date: 11-06-09
Report Date: 11-18-09
Submitted By: WILLIAM FRANKS

Material: SOIL
SITE: COOPER RANCH - TEST SITE #1 - BLOCK #12

DESCRIPTION	% SP	pH	EC dS/m	Ca (meq/L)	Mg (meq/L)	Na (meq/L)	K (meq/L)	Cl (meq/L)	ESP	T/ac GYP REQ	LIME PRESENCE LP	B (PPM)	NO_3N (PPM)	SO_4S (PPM)	Mo DTPA (PPM)
1. Blk #12 12"	49	7.5	2.09	<u>9.5</u>	3.9	8.7	0.3	10.7	3.6		-	0.3	12.6	110	1.33
2. 24"	56	7.6	2.75	9.7	7.9	<u>10.1</u>	0.5	11.7	3.6		-	0.4	8.3	150	1.53
3. 36"	56	7.7	4.31	<u>13.8</u>	15.0	13.6	0.5	16.1	3.9		-	0.3	12.4	242	2.07
OPTIMUM RANGES		6.0-7.5	<4.00 >0.60	(Ca > Mg + Na)			>0.4	<10	<5			>0.2 <1.5		>50	

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SOIL ANALYSIS

Client: M.R.W.P.C.A.
#5 HARRIS COURT
MONTEREY, CALIFORNIA 93946

Lab No.: 05-04S133
Sampled Date: 05-03-00
Submitted Date: 05-04-00
Report Date: 05-12-00
Submitted By: JAY PARKER

Material: SOIL -
RANCH: MOLEIZA RANCH T-LJ 3A

DESCRIPTION	% SP	pH	EC dS/m	Ca (meq/L)	Mg (meq/L)	Na (meq/L)	K (meq/L)	Cl (meq/L)	ESP	GYP - LIME (Tons/Acre, REQ or Presence)	B (PPM)	NO_3N (PPM)	PO_4P (PPM)	K AA (PPM)	Zn (PPM)	Mn (PPM)	Fe (PPM)	Cu (PPM)	SO_4S (PPM)
1. Blk 2 12"	21	7.4	0.93	<u>5.0</u>	1.3	2.3	0.9	1.0	<1.0	-	0.2								
2. 24"	34	7.1	0.77	3.3	0.8	<u>3.5</u>	0.1	1.6	2.3	-	0.2								
3. 36"	66	7.5	0.89	<u>4.7</u>	1.0	3.1	0.1	1.4	1.4	-	0.1								
OPTIMUM RANGES		6.0-7.5	<4.00 >0.60	(Ca > Mg + Na)			>0.4	<10	<5		>0.2 <1.5		>12.0	>150	>2.0	>5.0	>8.0	>1.0	>20

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SOIL ANALYSIS

Client: M.R.W.P.C.A.
#5 HARRIS COURT
MONTEREY, CALIFORNIA 93946

Lab No.: 05-04S133
Sampled Date: 05-03-00
Submitted Date: 05-04-00
Report Date: 06-12-00
Submitted By: J. PARKER

Material: SOIL

RANCH: MOLERA RANCH

Sample Description		-PPM- NO_3N
1. Blk 2	12"	17.1
2.	24"	12.3
3.	36"	3.9

IF YOU SHOULD HAVE ANY QUESTIONS, PLEASE CALL.

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SOIL ANALYSIS

Client: M.R.W.P.C.A.
#5 HARRIS COURT
MONTEREY, CALIFORNIA 93946

Lab No.: 06-09S139
Sampled Date: 06-06-00
Submitted Date: 06-09-00
Report Date: 06-13-00
Submitted By: JEFF PARKER

Material: SOIL -
RANCH: DOLE MOLERA RANCH #2

	%			---meq/L---						Tons/Acre		---PPM---								
DESCRIPTION	SP	pH	EC dS/m	Ca	Mg	Na	K	Cl	ESP	GYP - REQ or Presence	LIME	B	NO_3N	PO_4P	K AA	Zn	Mn	Fe	Cu	SO_4S
1. TEST SITE 3A 12"	63	7.2	4.43	21.5	13.1	8.7	1.0	2.8	1.8		-	0.4	54.3							343
2. 24"	61	7.4	2.75	8.4	7.8	10.9	0.4	4.4	4.2		-	0.3	4.8							237
3. 36"	58	7.5	2.17	5.0	5.0	11.4	0.3	4.6	5.9		-	0.3	5.0							168
4. TEST SITE 3 12"	48	7.2	2.67	14.8	6.3	5.0	0.6	2.1	<1.0		-	0.3	22.1							235
5. 24"	39	7.3	1.77	7.7	4.9	4.9	0.2	2.2	1.6		-	0.3	5.7							169
6. 36"	26	7.4	2.91	12.2	10.1	6.6	0.2	2.7	1.6		-	0.2	8.7							230
OPTIMUM RANGES		6.0- 7.5	<4.00 >0.60	(Ca > Mg + Na)			>0.4	<10	<5			>0.2 <1.5		>12.0	>150	>2.0	>5.0	>8.0	>1.0	>20

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IF YOU SHOULD HAVE ANY QUESTIONS, PLEASE CALL.

SAM MODESITT - CHEMIST

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SOIL ANALYSIS

Client: M.R.W.P.C.A.
#5 HARRIS COURT
MONTEREY, CALIFORNIA 93946

Lab No.: 06-30S596
Sampled Date: 06-29-00
Submitted Date: 06-30-00
Report Date: 07-05-00
Submitted By: JEFF PARKER

Material: SOIL -
RANCH: DOLE MOLERA - TEST SITE #3A

	%			-------------	meq/L	-------------				Tons/Acre	-------------				PPM				-------------
DESCRIPTION	SP	pH	EC dS/m	Ca	Mg	Na	K	Cl	ESP	GYP - LIME REQ or Presence	B	NO_3N	PO_4P	K AA	Zn	Mn	Fe	Cu	SO_4S
1. Blk 2 12"	57	7.3	2.48	$\underline{11.3}$	7.0	5.9	0.6	2.6	1.6	-	0.3	60.3							195
2. 24"	49	7.3	1.86	$\underline{7.6}$	5.1	5.5	0.4	2.4	1.9	-	0.3	54.8							153
3. 36"	71	7.4	1.32	2.2	2.8	$\underline{8.0}$	0.2	3.7	5.9	-	0.3	7.9							114
OPTIMUM RANGES		6.0- 7.5	<4.00 >0.60	(Ca > Mg + Na)			>0.4	<10	<5		>0.2 <1.5		>12.0	>150	>2.0	>5.0	>8.0	>1.0	>20

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SAM MODESITT - CHEMIST

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SOIL ANALYSIS

Client: M.R.W.P.C.A.
#5 HARRIS COURT
MONTEREY, CALIFORNIA 93946

Lab No.: 10-24S443 PO #016025
Sampled Date: 10-18-00
Submitted Date: 10-24-00
Report Date: 10-30-00
Submitted By: JEFF PARKER

Material: SOIL -
RANCH: DOLE MOLERA RANCH - TEST SITE #3A

DESCRIPTION		% SP	pH	EC dS/m	Ca (meq/L)	Mg (meq/L)	Na (meq/L)	K (meq/L)	Cl (meq/L)	ESP	Tons/Acre GYP - LIME REQ or Presence	B (PPM)	NO_3N (PPM)	PO_4P (PPM)	K AA (PPM)	Zn (PPM)	Mn (PPM)	Fe (PPM)	Cu (PPM)	SO_4S (PPM)
1. Blk #2	12"	59	7.6	2.90	<u>12.2</u>	9.4	7.1	0.3	1.8	1.9	-	0.2	26.8							281
2.	24"	70	7.7	1.82	3.7	5.0	<u>9.3</u>	0.2	3.4	5.0	-	0.2	4.9							168
3.	36"	76	7.7	0.81	0.3	1.1	<u>6.7</u>	0.1	2.6	9.4	-	0.2	5.1							76
OPTIMUM RANGES			6.0-7.5	<4.00 >0.60	(Ca > Mg + Na)			>0.4	<10	<5		>0.2 <1.5		>12.0	>150	>2.0	>5.0	>8.0	>1.0	>20

RED = LOW BLUE = HIGH <u>DOMINANT SOLUBLE SALT IS UNDERLINED</u>. SEE ENCLOSED INTERPRETATION GUIDES.

IF YOU SHOULD HAVE ANY QUESTIONS, PLEASE CALL.

SAM MODESITT - CHEMIST

Valley Tech
AGRICULTURAL LABORATORY SERVICES

2120 South 'K' Street
Tulare, California 93274
Office: 559 - 688-5684
Fax: 559 - 688-5768

SOIL ANALYSIS

Client: M.R.W.P.C.A.
#5 HARRIS COURT
MONTEREY, CALIFORNIA 93946

Lab No.: 03-23S234 PO #016025
Sampled Date: 03-19-01
Submitted Date: 03-23-01
Report Date: 03-28-01
Submitted By: WILLIAM FRANKS

Material: SOIL -
RANCH: DOLE MOLERA RANCH - TEST SITE #3A

	%			------------	meq/L	--------------				Tons/Acre		------------	------------	------------	PPM	------------	------------	------------	------------	------------
	SP	pH	EC	Ca	Mg	Na	K	Cl	ESP	GYP -	LIME	B	NO_3N	PO_4P	K	Zn	Mn	Fe	Cu	SO_4S
DESCRIPTION			dS/m							REQ or Presence					AA					
1. Blk #2 12"	67	7.1	4.65	22.6	14.0	8.8	1.1	1.9	1.7		-	0.3	55.4							369
2. 24"	68	7.0	3.47	13.2	11.3	9.5	0.7	2.6	2.7		-	0.3	76.2							215
3. 36"	76	7.2	2.23	5.1	5.7	11.2	0.4	3.2	5.5		-	0.3	5.1							174
OPTIMUM RANGES		6.0-7.5	<4.00 >0.60	(Ca > Mg + Na)			>0.4	<10	<5			>0.2 <1.5		>12.0	>150	>2.0	>5.0	>8.0	>1.0	>20

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SOIL ANALYSIS

Client: M.R.W.P.C.A.
#5 HARRIS COURT
MONTEREY, CALIFORNIA 93946

Lab No.: 06-11S216 PO #016025
Sampled Date: 06-08-01
Submitted Date: 06-11-01
Report Date: 06-18-01
Submitted By: WILLIAM FRANKS

Material: SOIL -
RANCH: DOLE MOLERA - TEST SITE 3A

DESCRIPTION	% SP	pH	EC dS/m	Ca (meq/L)	Mg (meq/L)	Na (meq/L)	K (meq/L)	Cl (meq/L)	ESP	GYP (Tons/Acre, REQ or Presence)	LIME (Tons/Acre, REQ or Presence)	B (PPM)	NO_3N (PPM)	PO_4P (PPM)	K AA (PPM)	Zn (PPM)	Mn (PPM)	Fe (PPM)	Cu (PPM)	SO_4S (PPM)
1. Blk 2 0-12"	60	6.9	3.46	16.0	10.0	7.9	0.7	2.5	1.9		-	0.4	9.3	100.9						285
2. 12-24"	57	7.0	2.43	8.6	6.9	8.4	0.4	2.7	3.1		-	0.4	8.6	100.8						175
3. 24-36"	67	7.1	1.71	2.9	3.8	10.2	0.2	4.4	6.5		-	0.4	7.2	43.1						119
OPTIMUM RANGES		6.0-7.5	<4.00 >0.60	(Ca > Mg + Na)			>0.4	<10	<5			>0.2 <1.5		>12.0	>150	>2.0	>5.0	>8.0	>1.0	>20

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SOIL ANALYSIS

Client: M.R.W.P.C.A.
#5 HARRIS COURT
MONTEREY, CALIFORNIA 93946

Lab No.: 10-22S382 PO #016025
Sampled Date:
Submitted Date: 10-22-01
Report Date: 11-05-01
Submitted By: JEFF PARKER

Material: SOIL -

RANCH: DOLE MOLERA RANCH - TEST SITE #3A

	%			meq/L						Tons/Acre	PPM								
DESCRIPTION	SP	pH	EC dS/m	Ca	Mg	Na	K	Cl	ESP	GYP - LIME REQ or Presence	B	NO_3N	PO_4P	K AA	Zn	Mn	Fe	Cu	SO_4S
1. Blk #2 12"	53	7.2	4.85	24.3	14.0	9.1	1.0	4.9	1.8	-	0.3	28.6							322
2. 24"	63	7.1	2.86	11.0	9.2	8.0	0.5	3.5	2.4	-	0.2	39.0							246
3. 36"	63	7.4	2.09	5.3	5.3	9.8	0.4	4.3	4.8	-	0.3	33.4							172
OPTIMUM RANGES		6.0-7.5	<4.00 >0.60	(Ca > Mg + Na)			>0.4	<10	<5		>0.2 <1.5		>12.0	>150	>2.0	>5.0	>8.0	>1.0	>20

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SOIL ANALYSIS

Client: M.R.W.P.C.A.
#5 HARRIS COURT
MONTEREY, CALIFORNIA 93946

Lab No.: 03-08S076 PO #016025
Sampled Date: 03-05-02
Submitted Date: 03-08-02
Report Date: 03-13-02
Submitted By: WILLIAM FRANKS

Material: SOIL -

RANCH: DOLE MOLERA RANCH - TEST SITE #3A

	%			------------meq/L				--------------		Tons/Acre		--------------			PPM					--------------
DESCRIPTION	SP	pH	EC dS/m	Ca	Mg	Na	K	Cl	ESP	GYP - REQ or Presence	LIME	B	NO_3N	PO_4P	K AA	Zn	Mn	Fe	Cu	SO_4S
1. Blk #2 12"	62	7.2	5.01	<u>23.3</u>	16.1	9.7	1.0	4.6	1.9		-	0.3	77.4							360
2. 24"	75	7.2	4.62	<u>19.0</u>	16.2	10.4	0.6	6.5	2.3		-	0.2	62.4							284
3. 36"	73	7.4	3.33	8.8	11.4	<u>12.8</u>	0.3	8.8	4.4		-	0.2	15.6							216
OPTIMUM RANGES		6.0- 7.5	<4.00 >0.60	(Ca > Mg + Na)			>0.4	<10	<5			>0.2 <1.5		>12.0	>150	>2.0	>5.0	>8.0	>1.0	>20

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SOIL ANALYSIS

Client: M.R.W.P.C.A.
#5 HARRIS COURT, Bldg D
MONTEREY, CALIFORNIA 93940-5756

Lab No.: 08-19S325 PO #000664
Sampled Date:
Submitted Date: 08-13-02
Report Date: 08-23-02
Submitted By: WILLIAM FARNKS

Material: SOIL -
RANCH: DOLE MOLERA RANCH - TEST SITE #3A

	%			------------	meq/L	------------				Tons/Acre	------------	------------	------------	PPM	------------	------------	------------	------------
DESCRIPTION	SP	pH	EC dS/m	Ca	Mg	Na	K	Cl	ESP	GYP - LIME REQ or Presence	B	NO_3N	PO_4P	K AA	Zn	Mn	Fe	Cu	SO_4S
1. Blk #2 12"	63	7.1	4.95	28.1	19.5	10.4	1.0	3.1	1.9	-	0.5	172.4	96.9						311
2. 24"	71	7.3	2.90	11.4	9.0	8.2	0.4	3.6	2.5	-	0.3	51.4	89.8						194
3. 36"	72	7.3	3.22	9.3	10.5	12.0	0.3	4.8	4.2	-	0.3	11.4	53.7						214
OPTIMUM RANGES		6.0- 7.5	<4.00 >0.60	(Ca > Mg + Na)			>0.4	<10	<5		>0.2 <1.5		>12.0	>150	>2.0	>5.0	>8.0	>1.0	>20

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SOIL ANALYSIS

Client: M.R.W.P.C.A.
#5 HARRIS COURT, Bldg D
MONTEREY, CALIFORNIA 93940-5756

Lab No.: 11-15S166 PO #000664
Sampled Date: 11-12-02
Submitted Date: 11-15-02
Report Date: 11-21-02
Submitted By: WILLIAM FRANKS

Material: SOIL - TEST SITE #3A
RANCH: DOLE MOLERA RANCH Blk #2

	%			------------	meq/L	------------	------------	------------		Tons/Acre		------------	------------	------------	PPM	------------	------------	------------	------------	------------
DESCRIPTION	SP	pH	EC dS/m	Ca	Mg	Na	K	Cl	ESP	GYP REQ or Presence	LIME	B	NO_3N	PO_4P	K AA	Zn	Mn	Fe	Cu	SO_4S
1. Test #3A 12"	64	7.0	6.28	29.5	20.3	11.6	1.4	13.5	2.1		-	0.2	51.9							203
2. 24"	68	7.3	2.66	11.6	7.4	7.3	0.3	6.6	2.2		-	0.2	24.9							85
3. 36"	69	7.6	2.41	7.2	6.6	10.1	0.2	9.1	4.3		-	0.2	4.2							87
OPTIMUM RANGES		6.0-7.5	<4.00 >0.60	(Ca > Mg + Na)			>0.4	<10	<5			>0.2 <1.5		>12.0	>150	>2.0	>5.0	>8.0	>1.0	>20

RED = LOW BLUE = HIGH DOMINANT SOLUBLE SALT IS UNDERLINED. SEE ENCLOSED INTERPRETATION GUIDES.

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SOIL ANALYSIS

Client: M.R.W.P.C.A.
#5 HARRIS COURT, Bldg D
MONTEREY, CALIFORNIA 93940-5756

Lab No.: 03-28S305 PO #000664
Sampled Date: 03-26-03
Submitted Date: 03-28-03
Report Date: 04-02-03
Submitted By: WILLIAM FRANKS

Material: SOIL - TEST
RANCH: DOLE - MOLERA RANCH - SITE 3A

	%			----meq/L----						T/ac	LIME	----PPM----								
DESCRIPTION	SP	pH	EC dS/m	Ca	Mg	Na	K	Cl	ESP	GYP REQ	PRESENCE LP	B	NO_3N	PO_4P	K AA	Zn	Mn	Fe	Cu	SO_4S
1. Blk #2 12"	68	7.2	5.25	23.9	15.9	11.4	1.3	2.9	2.5		-	0.5	42.4							573
2. 24"	67	7.3	4.93	19.0	14.7	14.9	0.7	6.8	3.9		-	0.4	32.5							472
3. 36"	63	7.4	5.61	16.7	14.4	24.4	0.6	7.9	7.3		-	0.5	6.0							594
OPTIMUM RANGES		6.0-7.5	<4.00 >0.60	(Ca > Mg + Na)			>0.4	<10	<5			>0.2 <1.5		>12.0	>150	>2.0	>5.0	>8.0	>1.0	>20

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SOIL ANALYSIS

Client: M.R.W.P.C.A.
#5 HARRIS COURT, Bldg D
MONTEREY, CALIFORNIA 93940-5756

Lab No.: 07-18S469 PO #001223
Sampled Date: 07-16-03
Submitted Date: 07-18-03
Report Date: 07-23-03
Submitted By: WILLIAM FRANKS

Material: SOIL -
RANCH: DOLE MOLERA RANCH - TEST SITE #3A

DESCRIPTION	% SP	pH	EC dS/m	Ca (meq/L)	Mg (meq/L)	Na (meq/L)	K (meq/L)	Cl (meq/L)	ESP	T/ac GYP REQ	LIME PRESENCE LP	B (PPM)	NO_3N (PPM)	PO_4P (PPM)	K AA (PPM)	Zn (PPM)	Mn (PPM)	Fe (PPM)	Cu (PPM)	SO_4S (PPM)
1. Blk #2 12"	64	7.4	4.42	19.1	13.8	10.4	1.0	11.6	2.5		-	0.5	68.0							441
2. 24"	65	7.3	3.57	13.1	10.3	11.8	0.5	13.6	3.7		-	0.4	32.2							394
3. 36"	65	7.7	2.61	6.0	8.2	11.7	0.3	14.1	4.9		-	0.4	1.9							321
OPTIMUM RANGES		6.0- 7.5	<4.00 >0.60	(Ca > Mg + Na)			>0.4	<10	<5			>0.2 <1.5		>12.0	>150	>2.0	>5.0	>8.0	>1.0	>20

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SOIL ANALYSIS

Client: M.R.W.P.C.A.
#5 HARRIS COURT, Bldg D
MONTEREY, CALIFORNIA 93940-5756

Lab No.: 10-24S494 PO #001223
Sampled Date: 10-22-03
Submitted Date: 10-24-03
Report Date: 11-06-03
Submitted By:

Material: SOIL -
RANCH: DOLE MOLERA RANCH - TEST SITE #3A

DESCRIPTION	% SP	pH	EC dS/m	meq/L Ca	meq/L Mg	meq/L Na	meq/L K	meq/L Cl	ESP	T/ac GYP REQ	LIME PRESENCE LP	PPM B	PPM NO_3N	PPM PO_4P	PPM K AA	PPM Zn	PPM Mn	PPM Fe	PPM Cu	PPM SO_4S
1. Blk #2 12"	63	7.4	5.24	<u>23.9</u>	16.3	11.3	0.9	10.9	2.4		-	0.3	61.2							273
2. 24"	72	7.5	3.32	<u>12.4</u>	10.1	10.2	0.5	8.1	3.1		-	0.2	8.8							180
3. 36"	70	7.7	2.84	7.5	8.4	<u>12.1</u>	0.4	7.9	4.8		-	0.2	4.6							160
OPTIMUM RANGES		6.0-7.5	<4.00 >0.60	(Ca > Mg + Na)			>0.4	<10	<5			>0.2 <1.5		>12.0	>150	>2.0	>5.0	>8.0	>1.0	>20

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SOIL ANALYSIS

Client: M.R.W.P.C.A.
#5 HARRIS COURT, Bldg D
MONTEREY, CALIFORNIA 93940-5756

RECEIVED
MAR 29 2004
INTO ACCOUNTING

Lab No.: 03-10S133 PO #001223
Sampled Date: 03-05-04
Submitted Date: 03-10-04
Report Date: 03-17-04
Submitted By: WILLIAM FRANKS

Material: SOIL -

RANCH: DOLE MOLERA RANCH - SITE 3A

DESCRIPTION	% SP	pH	EC dS/m	Ca (meq/L)	Mg (meq/L)	Na (meq/L)	K (meq/L)	Cl (meq/L)	ESP	T/ac GYP REQ	LIME PRESENCE LP	B (PPM)	NO_3N (PPM)	PO_4P (PPM)	K AA (PPM)	Zn (PPM)	Mn (PPM)	Fe (PPM)	Cu (PPM)	SO_4S (PPM)
1. Blk #2 12"	56	7.3	1.74	11.2	<u>11.6</u>	10.2	0.3	3.9	3.1		-	0.2	26.5							211
2. 24"	61	7.2	2.33	7.5	7.0	<u>10.1</u>	0.3	7.4	4.1		-	0.2	22.9							170
3. 36"	60	7.3	2.01	<u>15.4</u>	7.2	7.4	0.6	4.0	1.9		-	0.3	6.0							235
OPTIMUM RANGES		6.0-7.5	<4.00 >0.60	(Ca > Mg + Na)			>0.4	<10	<5			>0.2 <1.5		>12.0	>150	>2.0	>5.0	>8.0	>1.0	>50

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SOIL ANALYSIS

Client: M.R.W.P.C.A.
#5 HARRIS COURT, Bldg D
MONTEREY, CALIFORNIA 93940-5756

Lab No.: 07-16S377 PO #001785
Sampled Date: 07-16-04
Submitted Date: 07-16-04
Report Date: 07-26-04
Submitted By:

Material: SOIL -

RANCH: DOLE MOLERA RANCH - TEST SITE #3A

	%			------------	meq/L	-------------				T/ac	LIME	-------------	-------------	-------------	-------------	PPM	-------------	-------------	-------------	-------------
	SP	pH	EC	Ca	Mg	Na	K	Cl	ESP	GYP	PRESENCI	B	NO_3N	PO_4P	K	Zn	Mn	Fe	Cu	SO_4S
DESCRIPTION			dS/m							REQ	LP				AA					
1. Blk #2 12"	59	6.4	3.49	8.1	7.4	18.9	0.5	12.6	8.1		-	1.0	30.3							45
2. 24"	59	6.4	2.48	4.5	5.4	14.5	0.3	8.4	7.7		-	0.8	6.3							52
3. 36"	76	7.5	2.58	3.9	3.9	15.3	0.2	7.7	9.3		-	0.4	1.5							66
OPTIMUM RANGES		6.0- 7.5	<4.00 >0.60	(Ca > Mg + Na)			>0.4	<10	<5			>0.2 <1.5		>12.0	>150	>2.0	>5.0	>8.0	>1.0	>50

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SAM MODESITT - CHEMIST

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SOIL ANALYSIS

Client: M.R.W.P.C.A.
#5 HARRIS COURT, Bldg D
MONTEREY, CALIFORNIA 93940-5756

Lab No.: 07-30S730 PO #001785
Sampled Date: 07-28-04
Submitted Date: 07-30-04
Report Date: 08-05-04
Submitted By:

Material: SOIL -
RANCH: MOLERA RANCH - TEST SITE #3A

	%			------------meq/L	-------------					T/ac	LIME	----------------			---PPM---					----------------
	SP	pH	EC	Ca	Mg	Na	K	Cl	ESP	GYP	PRESENCE	B	NO_3N	PO_4P	K	Zn	Mn	Fe	Cu	SO_4S
DESCRIPTION			dS/m							REQ	LP				AA					
1. Blk #2 12"	74	7.2	2.29	9.8	5.6	7.8	0.5	9.0	2.8		+++	0.4	47.6							136
2. 24"	76	7.3	3.05	10.9	9.6	9.7	0.4	12.0	3.1		-	0.3	12.0							200
3. 36"	73	7.4	2.23	7.7	6.2	10.2	0.3	8.2	4.3		-	0.2	2.5							186
OPTIMUM RANGES		6.0- 7.5	<4.00 >0.60	(Ca > Mg + Na)			>0.4	<10	<5			>0.2 <1.5		>12.0	>150	>2.0	>5.0	>8.0	>1.0	>50

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SAM MODESITT - CHEMIST

Valley Tech

AGRICULTURAL LABORATORY SERVICES

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Tulare, California 93274
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SOIL ANALYSIS

Client: M.R.W.P.C.A.
#5 HARRIS COURT, Bldg D
MONTEREY, CALIFORNIA 93940-5756

Lab No.: 10-16S356 PO #001785
Sampled Date: 10-13-04
Submitted Date: 10-16-04
Report Date: 11-09-04
Submitted By: W. FRANKS

Material: SOIL -

RANCH: DOLE MOLERA RANCH - TEST SITE #3A

DESCRIPTION	% SP	pH	EC dS/m	Ca (meq/L)	Mg (meq/L)	Na (meq/L)	K (meq/L)	Cl (meq/L)	ESP	T/ac GYP REQ	LIME PRESENCE LP	B (PPM)	NO_3N (PPM)	PO_4P (PPM)	K AA (PPM)	Zn (PPM)	Mn (PPM)	Fe (PPM)	Cu (PPM)	SO_4S (PPM)
1. Blk #2 12"	70	7.4	3.06	13.3	8.8	10.4	0.4	15.2	3.2		-	0.2	77.7							203
2. 24"	65	7.4	3.07	13.4	8.8	9.8	0.4	14.0	3.0		-	0.2	6.7							206
3. 36"	71	7.3	2.61	9.2	7.3	12.1	0.2	11.0	4.7		-	0.1	2.3							203
OPTIMUM RANGES		6.0-7.5	<4.00 >0.60	(Ca > Mg + Na)			>0.4	<10	<5			>0.2 <1.5		>12.0	>150	>2.0	>5.0	>8.0	>1.0	>50

RED = LOW BLUE = HIGH DOMINANT SOLUBLE SALT IS UNDERLINED. SEE ENCLOSED INTERPRETATION GUIDES.

IF YOU SHOULD HAVE ANY QUESTIONS, PLEASE CALL.

SAM MODESITT - CHEMIST

Valley Tech
AGRICULTURAL LABORATORY SERVICES

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Tulare, California 93274
Office: 559 - 688-5684
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SOIL ANALYSIS

Client: M.R.W.P.C.A.
#5 HARRIS COURT, Bldg D
MONTEREY, CALIFORNIA 93940-5756

Lab No.: 05-11S253 PO #001785
Sampled Date: 05-10-05
Submitted Date: 05-11-05
Report Date: 05-25-05
Submitted By: W. FRANKS

Material: SOIL -
RANCH: DOLE MOLERA RANCH - TEST SITE #3A

DESCRIPTION	% SP	pH	EC dS/m	Ca (meq/L)	Mg (meq/L)	Na (meq/L)	K (meq/L)	Cl (meq/L)	ESP	T/ac GYP REQ	LIME PRESENCE LP	B (PPM)	NO_3N (PPM)	PO_4P (PPM)	K AA (PPM)	Zn (PPM)	Mn (PPM)	Fe (PPM)	Cu (PPM)	SO_4S (PPM)
1. Blk #2 12"	67	7.4	1.84	11.6	2.0	4.5	0.2	4.6	1.3		-	0.4	1.9							57
2. 24"	64	7.6	2.63	8.2	9.5	9.9	0.4	11.4	3.5		-	0.3	3.1							232
3. 36"	68	7.5	2.95	6.3	9.4	14.1	0.4	11.2	5.8		-	0.4	17.5							234
OPTIMUM RANGES		6.0-7.5	<4.00 >0.60	(Ca > Mg + Na)			>0.4	<10	<5			>0.2 <1.5		>12.0	>150	>2.0	>5.0	>8.0	>1.0	>50

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SOIL ANALYSIS

Client: M.R.W.P.C.A.
#5 HARRIS COURT, Bldg D
MONTEREY, CALIFORNIA 93940-5756

Lab No.: 10-12S301 PO #002409
Sampled Date: 10-07-05
Submitted Date: 10-12-05
Report Date: 11-04-05
Submitted By: BILL FRANKS

Material: SOIL -

RANCH: DOLE MOLERA RANCH - TEST SITE #3A

	%			------------	meq/L	------------				T/ac	LIME	------------	------------	------------	PPM	------------	------------	------------	------------	------------
DESCRIPTION	SP	pH	EC dS/m	Ca	Mg	Na	K	Cl	ESP	GYP REQ	PRESENCE LP	B	NO_3N	PO_4P	K AA	Zn	Mn	Fe	Cu	SO_4S
1. Blk #2 12"	68	7.4	2.81	11.1	6.7	10.2	0.6	16.8	3.7		-	0.3	3.2							138
2. 24"	69	7.5	3.27	12.7	10.1	11.1	0.4	14.5	3.5		-	0.2	1.1							256
3. 36"	70	7.5	2.61	8.2	5.8	12.2	0.3	9.7	5.2		-	0.1	1.7							194
OPTIMUM RANGES		6.0- 7.5	<4.00 >0.60	(Ca > Mg + Na)			>0.4	<10	<5			>0.2 <1.5		>12.0	>150	>2.0	>5.0	>8.0	>1.0	>50

RED = LOW BLUE = HIGH DOMINANT SOLUBLE SALT IS UNDERLINED. SEE ENCLOSED INTERPRETATION GUIDES.

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SOIL ANALYSIS

Client: M.R.W.P.C.A.
#5 HARRIS COURT, Bldg D
MONTEREY, CALIFORNIA 93940-5756

Lab No.: 05-02S029 PO #002409
Sampled Date: 04-27-06
Submitted Date: 05-02-06
Report Date: 05-09-06
Submitted By: W. FRANKS

Material: SOIL -
RANCH: DOLE MOLERA RANCH - TEST SITE #3A

DESCRIPTION	% SP	pH	EC dS/m	Ca (meq/L)	Mg (meq/L)	Na (meq/L)	K (meq/L)	Cl (meq/L)	ESP	T/ac GYP REQ	LIME PRESENCE LP	B (PPM)	NO_3N (PPM)	PO_4P (PPM)	K AA (PPM)	Zn (PPM)	Mn (PPM)	Fe (PPM)	Cu (PPM)	SO_4S (PPM)
1. Blk #2 12"	64	7.5	1.31	5.5	1.9	5.7	0.4	3.3	3.0		-	0.3	19.0							106
2. 24"	67	7.5	2.51	9.8	5.2	10.2	0.3	11.4	4.1		-	0.3	1.8							206
3. 36"	69	7.6	2.40	7.0	5.0	12.1	0.2	9.9	5.7		-	0.3	1.5							207
OPTIMUM RANGES		6.0- 7.5	<4.00 >0.60	(Ca > Mg + Na)			>0.4	<10	<5			>0.2 <1.5		>12.0	>150	>2.0	>5.0	>8.0	>1.0	>50

RED = LOW BLUE = HIGH DOMINANT SOLUBLE SALT IS UNDERLINED. SEE ENCLOSED INTERPRETATION GUIDES.

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SOIL ANALYSIS

Client: M.R.W.P.C.A.
#5 HARRIS COURT, Bldg D
MONTEREY, CALIFORNIA 93940-5756

Lab No.: 07-11S172 PO #002409
Sampled Date: 07-06-06
Submitted Date: 07-11-06
Report Date: 07-25-06
Submitted By: W. FRANKS

Material: SOIL -

RANCH: DOLE MOLERA RANCH - TEST SITE #3A

DESCRIPTION	% SP	pH	EC dS/m	Ca (meq/L)	Mg (meq/L)	Na (meq/L)	K (meq/L)	Cl (meq/L)	ESP	T/ac GYP REQ	LIME PRESENCE LP	B (PPM)	NO_3N (PPM)	PO_4P (PPM)	K AA (PPM)	Zn (PPM)	Mn (PPM)	Fe (PPM)	Cu (PPM)	SO_4S (PPM)
1. Blk #2 12"	69	7.3	2.40	11.8	2.9	8.8	0.6	8.8	3.4		-	0.4	2.5							105
2. 24"	84	7.4	3.34	11.9	7.1	12.9	0.4	14.7	4.7		-	0.3	1.7							237
3. 36"	71	7.7	2.47	9.4	3.6	12.9	0.5	10.9	5.8		-	0.2	46.1							191
OPTIMUM RANGES		6.0-7.5	<4.00 >0.60	(Ca > Mg + Na)			>0.4	<10	<5			>0.2 <1.5		>12.0	>150	>2.0	>5.0	>8.0	>1.0	>50

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SOIL ANALYSIS

Client: M.R.W.P.C.A.
#5 HARRIS COURT, Bldg D
MONTEREY, CALIFORNIA 93940-5756

Lab No.: 04-03S043 PO #002409
Sampled Date: 03-29-07
Submitted Date: 04-03-07
Report Date: 04-17-07
Submitted By: W. FRANKS

Material: SOIL -
RANCH: DOLE MOLERA RANCH - TEST SITE #3A

DESCRIPTION	% SP	pH	EC dS/m	Ca (meq/L)	Mg (meq/L)	Na (meq/L)	K (meq/L)	Cl (meq/L)	ESP	T/ac GYP REQ	LIME PRESENCE LP	B (PPM)	NO_3N (PPM)	PO_4P (PPM)	K AA (PPM)	Zn (PPM)	Mn (PPM)	Fe (PPM)	Cu (PPM)	SO_4S (PPM)
1. Blk #2 12"	76	7.0	3.72	16.8	10.2	11.7	0.9	9.2	3.3		-	0.3	74.7							245
2. 24"	75	7.4	2.37	8.7	6.5	9.1	0.4	10.0	3.5		-	0.2	9.6							168
3. 36"	83	7.5	2.29	6.4	5.9	11.2	0.3	9.4	5.1		-	0.2	2.5							186
OPTIMUM RANGES		6.0- 7.5	<4.00 >0.60	(Ca > Mg + Na)			>0.4	<10	<5			>0.2 <1.5		>12.0	>150	>2.0	>5.0	>8.0	>1.0	>50

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IF YOU SHOULD HAVE ANY QUESTIONS, PLEASE CALL.

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SOIL ANALYSIS

Client: M.R.W.P.C.A.
#5 HARRIS COURT, Bldg D
MONTEREY, CALIFORNIA 93940-5756

Lab No.: 07-10S168 PO #002409
Sampled Date: 07-09-07
Submitted Date: 07-10-07
Report Date: 07-19-07
Submitted By: WILLIAM FRANKS

Material: SOIL -

RANCH: DOLE MOLERA RANCH - TEST SITE #3A

	%			------------meq/L	--------------					T/ac	LIME	------------------------------	------	------	PPM	------	------	------	------	------
DESCRIPTION	SP	pH	EC dS/m	Ca	Mg	Na	K	Cl	ESP	GYP REQ	PRESENCE LP	B	NO_3N	PO_4P	K AA	Zn	Mn	Fe	Cu	SO_4S
1. Blk #2 12"	74	7.2	2.90	11.8	6.5	10.9	0.7	11.8	3.9		-	0.4	6.1							222
2. 24"	68	7.4	3.37	12.1	10.1	12.4	0.4	14.7	4.0		-	0.3	1.7							257
3. 36"	72	7.6	2.18	6.3	4.9	10.5	0.2	8.0	5.1		-	0.2	1.3							186
OPTIMUM RANGES		6.0- 7.5	<4.00 >0.60	(Ca > Mg + Na)			>0.4	<10	<5			>0.2 <1.5		>12.0	>150	>2.0	>5.0	>8.0	>1.0	>50

RED = LOW BLUE = HIGH DOMINANT SOLUBLE SALT IS UNDERLINED. SEE ENCLOSED INTERPRETATION GUIDES.

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SOIL ANALYSIS

Client: M.R.W.P.C.A.
#5 HARRIS COURT, Bldg D
MONTEREY, CALIFORNIA 93940-5756

Lab No.: 10-13S399 PO #003859
Sampled Date: 10-09-07
Submitted Date: 10-13-07
Report Date: 11-13-07
Submitted By: W. FRANKS

Material: SOIL -
RANCH: DOLE MOLERA RANCH - TEST SITE #3A

DESCRIPTION		% SP	pH	EC dS/m	Ca (meq/L)	Mg (meq/L)	Na (meq/L)	K (meq/L)	Cl (meq/L)	ESP	T/ac GYP REQ	LIME PRESENCE LP	B (PPM)	NO_3N (PPM)	PO_4P (PPM)	K AA (PPM)	Zn (PPM)	Mn (PPM)	Fe (PPM)	Cu (PPM)	SO_4S (PPM)
1. Blk #2	12"	61	7.2	3.27	15.6	10.4	13.5	0.7	13.5	4.1		-	0.4	88.9							195
2.	24"	73	7.5	3.26	15.0	11.2	13.5	0.4	17.6	4.1		-	0.2	26.1							267
3.	36"	70	7.7	2.26	6.2	8.3	12.9	0.3	10.0	5.5		-	0.3	2.6							231
OPTIMUM RANGES			6.0-7.5	<4.00 >0.60	(Ca > Mg + Na)			>0.4	<10	<5			>0.2 <1.5		>12.0	>150	>2.0	>5.0	>8.0	>1.0	>50

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IF YOU SHOULD HAVE ANY QUESTIONS, PLEASE CALL.

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SOIL ANALYSIS

Client: M.R.W.P.C.A.
#5 HARRIS COURT, Bldg D
MONTEREY, CALIFORNIA 93940-5756

Lab No.: 03-11S110 PO #003859
Sampled Date: 03-06-08
Submitted Date: 03-11-08
Report Date: 03-20-08
Submitted By: WILLIAM FRANKS

Material: SOIL -
RANCH: DOLE MOLERA RANCH - TEST SITE #3a

DESCRIPTION		% SP	pH	EC dS/m	Ca (meq/L)	Mg (meq/L)	Na (meq/L)	K (meq/L)	Cl (meq/L)	ESP	T/ac GYP REQ	LIME PRESENCE LP	B (PPM)	NO_3N (PPM)	PO_4P (PPM)	K AA (PPM)	Zn (PPM)	Mn (PPM)	Fe (PPM)	Cu (PPM)	SO_4S (PPM)
1. Blk #2	12"	61	7.4	2.26	<u>9.5</u>	6.2	8.6	0.5	6.3	3.2		-	0.3	71.7							190
2.	24"	58	7.3	3.79	<u>16.8</u>	9.7	13.2	0.3	16.5	3.9		-	0.1	36.6							262
3.	36"	60	7.6	2.67	7.7	8.0	<u>11.2</u>	0.4	11.0	4.4		-	0.2	5.5							213
OPTIMUM RANGES			6.0-7.5	<4.00 >0.60	(Ca > Mg + Na)			>0.4	<10	<5			>0.2 <1.5		>12.0	>150	>2.0	>5.0	>8.0	>1.0	>50

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SOIL ANALYSIS

Client: M.R.W.P.C.A.
#5 HARRIS COURT, Bldg D
MONTEREY, CALIFORNIA 93940-5756

Lab No.: 07-14S351 PO #004430
Sampled Date: 07-09-08
Submitted Date: 07-14-08
Report Date: 08-01-08
Submitted By: WILLIAM FRANKS

Material: SOIL -
RANCH: DOLE MOLERA RANCH - TEST SITE #3A

DESCRIPTION	% SP	pH	EC dS/m	Ca (meq/L)	Mg (meq/L)	Na (meq/L)	K (meq/L)	Cl (meq/L)	ESP	T/ac GYP REQ	LIME PRESENCE LP	B (PPM)	NO_3N (PPM)	PO_4P (PPM)	K AA (PPM)	Zn (PPM)	Mn (PPM)	Fe (PPM)	Cu (PPM)	SO_4S (PPM)
1. Blk #2 12"	55	7.0	3.54	15.0	8.5	13.1	1.1	12.3	4.2		-	0.4	64.4							301
2. 24"	62	7.3	3.05	10.9	8.5	12.5	0.8	12.1	4.5		+	0.3	19.9							277
3. 36"	58	7.4	2.60	7.4	7.3	12.3	0.6	11.0	5.1		+	0.3	2.8							244
OPTIMUM RANGES		6.0-7.5	<4.00 >0.60	(Ca > Mg + Na)			>0.4	<10	<5			>0.2 <1.5		>12.0	>150	>2.0	>5.0	>8.0	>1.0	>50

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SOIL ANALYSIS

Client: M.R.W.P.C.A.
#5 HARRIS COURT, Bldg D
MONTEREY, CALIFORNIA 93940-5756

Lab No.: 10-01S021 PO #004430
Sampled Date:
Submitted Date: 10-01-08
Report Date: 10-13-08
Submitted By: WILLIAM FRANKS

Material: SOIL -
RANCH: DOLE MOLERA RANCH - TEST SITE #3-A

DESCRIPTION	% SP	pH	EC dS/m	Ca (meq/L)	Mg (meq/L)	Na (meq/L)	K (meq/L)	Cl (meq/L)	ESP	T/ac GYP REQ	LIME PRESENCE LP	B (PPM)	NO_3N (PPM)	PO_4P (PPM)	K AA (PPM)	Zn (PPM)	Mn (PPM)	Fe (PPM)	Cu (PPM)	SO_4S (PPM)
1. Blk #2 12"	55	7.1	4.79	19.6	12.7	16.0	0.8	16.4	4.4		-	0.4	96.5							271
2. 24"	57	7.5	3.98	14.0	11.4	14.4	0.4	17.8	4.5		+	0.2	19.5							251
3. 36"	63	7.5	3.51	10.0	9.9	14.9	0.4	14.0	5.4		+	0.2	14.3							236
OPTIMUM RANGES		6.0- 7.5	<4.00 >0.60	(Ca > Mg + Na)			>0.4	<10	<5			>0.2 <1.5		>12.0	>150	>2.0	>5.0	>8.0	>1.0	>50

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SOIL ANALYSIS

Client:	M.R.W.P.C.A. #5 HARRIS COURT, Bldg D MONTEREY, CALIFORNIA 93940-5756	**Lab No.:**	03-30S312 PO #004430
		Sampled Date:	03-25-09
		Submitted Date:	03-30-09
		Report Date:	04-08-09
Material:	SOIL	**Submitted By:**	WILLIAM FRANKS
SITE:	DOLE MOLERA RANCH TEST SITE #3A - BLOCK 2		

DESCRIPTION		% SP	pH	EC dS/m	Ca (meq/L)	Mg (meq/L)	Na (meq/L)	K (meq/L)	Cl (meq/L)	ESP	T/ac GYP REQ	LIME PRESENCE LP	B (PPM)	NO_3N (PPM)	SO_4S (PPM)	Mo DTPA (PPM)
1. Blk #2	12"	78	7.3	1.82	5.8	3.9	<u>8.3</u>	0.6	3.7	4.1		-	0.4	37.4	117	0.09
2.	24"	73	7.1	3.49	12.7	10.0	<u>13.1</u>	0.6	11.6	4.3		-	0.3	51.9	186	0.14
3.	36"	64	7.2	2.73	8.3	7.8	<u>13.2</u>	0.4	13.0	5.3		-	0.2	7.7	156	0.17
OPTIMUM RANGES			6.0-7.5	<4.00 >0.60	(Ca > Mg + Na)			>0.4	<10	<5			>0.2 <1.5		>50	

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SOIL ANALYSIS

Client: M.R.W.P.C.A.
#5 HARRIS COURT, Bldg D
MONTEREY, CALIFORNIA 93940-5756

Lab No.: 05-28S1109
PO No.: 004430
Sampled Date: 05-26-09
Submitted Date: 05-28-09
Report Date: 06-05-09
Submitted By: WILLIAM FRANKS

Material: SOIL
SITE: DOLE MOLERA RANCH - TEST SITE #3A BLK #2

DESCRIPTION		% SP	pH	EC dS/m	Ca (meq/L)	Mg (meq/L)	Na (meq/L)	K (meq/L)	Cl (meq/L)	ESP	T/ac GYP REQ	LIME PRESENCE LP	B (PPM)	NO_3N (PPM)	SO_4S (PPM)	Mo DTPA (PPM)
1. Test #3A Blk #2	12"	58	7.4	1.08	2.8	2.0	6.0	0.3	2.9	4.3		-	0.5	21.3	74	0.07
2.	24"	69	7.4	2.75	9.2	7.7	12.2	0.3	10.0	4.7		-	0.3	13.5	190	0.08
3.	36"	67	7.5	2.25	4.9	5.7	12.5	0.2	7.6	6.3		+	0.3	6.6	135	0.13
OPTIMUM RANGES			6.0- 7.5	<4.00 >0.60	(Ca > Mg + Na)			>0.4	<10	<5			>0.2 <1.5		>50	

RED = LOW BLUE = HIGH DOMINANT SOLUBLE SALT IS UNDERLINED. SEE ENCLOSED INTERPRETATION GUIDES.

IF YOU SHOULD HAVE ANY QUESTIONS, PLEASE CALL.

SAM MODESITT - CHEMIST

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Tulare, California 93274
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Fax: 559 - 688-5768

SOIL ANALYSIS

Client: M.R.W.P.C.A.
#5 HARRIS COURT, Bldg D
MONTEREY, CALIFORNIA 93940-5756

Lab No.: 11-03S073 PO #005131
Sampled Date: 11-03-09
Submitted Date: 11-03-09
Report Date: 11-18-09
Submitted By: WILLIAM FRANKS

Material: SOIL
SITE: DOLE MOLERA RANCH - TEST SITE #3A - BLOCK #2

DESCRIPTION	% SP	pH	EC dS/m	Ca (meq/L)	Mg (meq/L)	Na (meq/L)	K (meq/L)	Cl (meq/L)	ESP	T/ac GYP REQ	LIME PRESENCE LP	B (PPM)	NO_3N (PPM)	SO_4S (PPM)	Mo DTPA (PPM)
1. Blk #2 12"	41	7.1	5.57	<u>27.4</u>	12.9	17.1	1.1	25.8	4.2		-	0.3	78.9	206	0.73
2. 24"	40	7.5	2.59	<u>9.9</u>	5.5	9.8	0.5	14.5	3.8		-	0.3	9.9	108	0.62
3. 36"	40	7.7	2.63	<u>11.4</u>	5.8	9.0	0.3	14.8	3.2		-	0.1	1.7	125	1.02
OPTIMUM RANGES		6.0-7.5	<4.00 >0.60	(Ca > Mg + Na)			>0.4	<10	<5			>0.2 <1.5		>50	

RED = LOW BLUE = HIGH <u>DOMINANT SOLUBLE SALT IS UNDERLINED</u>. SEE ENCLOSED INTERPRETATION GUIDES.

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SOIL ANALYSIS

Client: M.R.W.P.C.A.
#5 HARRIS COURT
MONTEREY, CALIFORNIA 93946

Lab No.: 04-05S045
Sampled Date: 03-30-00
Submitted Date: 04-05-00
Report Date: 04-12-00
Submitted By: GREG ANTOZ

Material: SOIL -
RANCH: SAN JON TEST 4

	%			------------meq/L-------------						Tons/Acre	-----PPM-----								
DESCRIPTION	SP	pH	EC dS/m	Ca	Mg	Na	K	Cl	ESP	GYP - LIME REQ or Presence	B	NO_3N	PO_4P	K AA	Zn	Mn	Fe	Cu	SO_4S
1. BIK 8 0-12"	51	6.0	1.19	4.1	2.3	5.1	0.4	2.3	2.9	-	0.4								
2. 12-24"	52	6.3	2.08	8.6	6.4	5.6	0.2	2.5	1.8	-	0.1								
3. 24-36"	51	7.1	1.79	5.8	7.2	4.7	0.1	2.6	1.4	-	0.1								
OPTIMUM RANGES		6.0-7.5	<4.00 >0.60	(Ca > Mg + Na)			>0.4	<10	<5		>0.2 <1.5		>12.0	>150	>2.0	>5.0	>8.0	>1.0	>20

RED = LOW BLUE = HIGH DOMINANT SOLUBLE SALT IS UNDERLINED. SEE ENCLOSED INTERPRETATION GUIDES.

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SAM MODESITT - CHEMIST

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SOIL ANALYSIS

Client: M.R.W.P.C.A.
#5 HARRIS COURT
MONTEREY, CALIFORNIA 93946

Lab No.: 04-05S045
Sampled Date: 03-30-00
Submitted Date: 04-05-00
Report Date: 06-12-00
Submitted By: GREG ANTOZ

Material: SOIL

RANCH: SAN JON TEST 4

Sample Description		-PPM- NO_3N
1. BIK 8	0-12"	27.2
2.	12-24"	68.5
3.	24-36"	35.7

IF YOU SHOULD HAVE ANY QUESTIONS, PLEASE CALL.

SAM MODESITT - CHEMIST

FROM : VALLEY TECH PHONE NO. : 5596885768 Jun. 12 2000 12:31PM P7

Valley Tech
AGRICULTURAL LABORATORY SERVICES

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Tulare, California 93274
Office: 559 - 688-5684
Fax: 559 - 688-5768

SOIL ANALYSIS

Client: M.R.W.P.C.A.
#5 HARRIS COURT
MONTEREY, CALIFORNIA 93946

Lab No.: 08-03S054 PO #016025
Sampled Date: 07-28-00
Submitted Date: 08-03-00
Report Date: 08-14-00
Submitted By: JEFF PARKER

Material: SOIL -
RANCH: SAN JON RANCH - TEST SITE 4

	%			meq/L						Tons/Acre	PPM								
DESCRIPTION	SP	pH	EC dS/m	Ca	Mg	Na	K	Cl	ESP	GYP - LIME REQ or Presence	B	NO_3N	PO_4P	K AA	Zn	Mn	Fe	Cu	SO_4S
1. Blk 4 0-12"	52	5.3	0.88	3.1	1.4	4.2	0.2	1.8	2.8	-	0.7	5.6							40
2. 12-24"	50	5.5	0.66	1.9	1.9	2.7	0.1	1.0	1.6	-	0.2	5.3							32
3. 24-36"	56	7.3	1.31	4.6	5.4	3.1	0.1	1.5	<1.0	+++	0.1	17.3							36
OPTIMUM RANGES		6.0- 7.5	<4.00 >0.60	(Ca > Mg + Na)			>0.4	<10	<5		>0.2 <1.5		>12.0	>150	>2.0	>5.0	>8.0	>1.0	>20

RED = LOW BLUE = HIGH DOMINANT SOLUBLE SALT IS UNDERLINED. SEE ENCLOSED INTERPRETATION GUIDES.

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SOIL ANALYSIS

Client: M.R.W.P.C.A.
#5 HARRIS COURT
MONTEREY, CALIFORNIA 93946

Lab No.: 10-20S383 PO #016025
Sampled Date: 10-17-00
Submitted Date: 10-20-00
Report Date: 10-25-00
Submitted By: JEFF PARKER

Material: SOIL -
RANCH: SAN JON RANCH - TEST SITE #4

	%			------------meq/L				--------------		Tons/Acre	--------------------------------			PPM				------------------------
DESCRIPTION	SP	pH	EC dS/m	Ca	Mg	Na	K	Cl	ESP	GYP - LIME REQ or Presence	B	NO_3N	PO_4P	K AA	Zn	Mn	Fe	Cu	SO_4S
1. Blk #8 12"	50	6.4	1.00	4.1	1.9	3.8	0.1	1.7	2.0	-	0.2	30.6							27
2. 24"	47	6.5	1.40	4.9	5.1	3.8	0.1	1.7	1.2	-	0.1	41.7							32
3. 36"	51	7.6	0.98	3.4	3.6	2.8	0.1	1.2	<1.0	-	0.1	28.1							23
OPTIMUM RANGES		6.0- 7.5	<4.00 >0.60	(Ca > Mg + Na)			>0.4	<10	<5		>0.2 <1.5		>12.0	>150	>2.0	>5.0	>8.0	>1.0	>20

RED = LOW BLUE = HIGH DOMINANT SOLUBLE SALT IS UNDERLINED. SEE ENCLOSED INTERPRETATION GUIDES.

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SOIL ANALYSIS

Client: M.R.W.P.C.A.
#5 HARRIS COURT
MONTEREY, CALIFORNIA 93946

Material: SOIL -

RANCH: SAN JON RANCH - TEST SITE #4

Lab No.: 03-23S236 PO #016025
Sampled Date: 03-19-01
Submitted Date: 03-23-01
Report Date: 03-28-01
Submitted By: WILLIAM FRANKS

	%			------------meq/L			--------------			Tons/Acre		-----------------PPM								-----------------
DESCRIPTION	SP	pH	EC dS/m	Ca	Mg	Na	K	Cl	ESP	GYP - REQ or Presence	LIME	B	NO_3N	PO_4P	K AA	Zn	Mn	Fe	Cu	SO_4S
1. Blk #8 12"	57	7.1	0.59	1.9	0.9	2.8	0.2	0.9	2.2		-	0.2	4.3							18
2. 24"	57	6.5	0.65	2.3	1.8	2.3	0.1	0.8	1.1		-	0.1	10.0							25
3. 36"	59	7.2	1.03	3.5	3.9	2.8	0.1	1.1	<1.0		+++	0.1	19.6							26
OPTIMUM RANGES		6.0-7.5	<4.00 >0.60	(Ca > Mg + Na)			>0.4	<10	<5			>0.2 <1.5		>12.0	>150	>2.0	>5.0	>8.0	>1.0	>20

RED = LOW BLUE = HIGH **DOMINANT SOLUBLE SALT IS UNDERLINED.** SEE ENCLOSED INTERPRETATION GUIDES.

IF YOU SHOULD HAVE ANY QUESTIONS, PLEASE CALL.

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SOIL ANALYSIS

Client: M.R.W.P.C.A.
#5 HARRIS COURT
MONTEREY, CALIFORNIA 93946

Lab No.: 08-10S205 PO #016025
Sampled Date: 08-08-01
Submitted Date: 08-10-01
Report Date: 08-15-01
Submitted By:

Material: SOIL -
RANCH: SAN JON RANCH - TEST SITE #4

	%			meq/L						Tons/Acre	PPM								
DESCRIPTION	SP	pH	EC dS/m	Ca	Mg	Na	K	Cl	ESP	GYP - LIME REQ or Presence	B	NO_3N	PO_4P	K AA	Zn	Mn	Fe	Cu	SO_4S
1. Blk #8 12"	51	5.9	2.19	8.1	5.3	8.1	0.4	3.1	3.2	-	0.5	38.4							70
2. 24"	51	6.0	1.39	5.5	4.4	3.9	0.2	1.5	1.3	-	0.3	30.5							50
3. 36"	53	7.5	1.24	4.7	4.2	3.4	0.1	1.4	1.1	++	0.2	26.3							41
OPTIMUM RANGES		6.0- 7.5	<4.00 >0.60	(Ca > Mg + Na)			>0.4	<10	<5		>0.2 <1.5		>12.0	>150	>2.0	>5.0	>8.0	>1.0	>20

RED = LOW BLUE = HIGH DOMINANT SOLUBLE SALT IS UNDERLINED. SEE ENCLOSED INTERPRETATION GUIDES.

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SOIL ANALYSIS

Client: M.R.W.P.C.A.
#5 HARRIS COURT
MONTEREY, CALIFORNIA 93946

Lab No.: 10-30S480 PO #016025
Sampled Date: 10-26-01
Submitted Date: 10-30-01
Report Date: 11-05-01
Submitted By: JEFF PARKER

Material: SOIL -
RANCH: SAN JON RANCH - TEST SITE #4

DESCRIPTION	% SP	pH	EC dS/m	Ca (meq/L)	Mg (meq/L)	Na (meq/L)	K (meq/L)	Cl (meq/L)	ESP	GYP (Tons/Acre, REQ or Presence)	LIME (Tons/Acre, REQ or Presence)	B (PPM)	NO_3N (PPM)	PO_4P (PPM)	K AA (PPM)	Zn (PPM)	Mn (PPM)	Fe (PPM)	Cu (PPM)	SO_4S (PPM)
1. Blk #8 12"	51	6.4	1.43	5.1	3.0	5.8	0.4	2.5	2.9		-	0.3	36.2							46
2. 24"	49	6.8	1.62	6.1	4.9	4.9	0.3	2.1	1.8		-	0.1	25.1							45
3. 36"	53	7.7	1.27	4.5	4.5	3.5	0.3	1.5	1.1		+++	0.1	18.9							38
OPTIMUM RANGES		6.0-7.5	<4.00 >0.60	(Ca > Mg + Na)			>0.4	<10	<5			>0.2 <1.5		>12.0	>150	>2.0	>5.0	>8.0	>1.0	>20

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SOIL ANALYSIS

Client: M.R.W.P.C.A.
#5 HARRIS COURT
MONTEREY, CALIFORNIA 93946

Lab No.: 03-18S180 PO #016025
Sampled Date: 03-14-02
Submitted Date: 03-18-02
Report Date: 04-02-02
Submitted By:

Material: SOIL -
RANCH: SAN JON RANCH - TEST SITE #4

DESCRIPTION	% SP	pH	EC dS/m	meq/L Ca	Mg	Na	K	Cl	ESP	Tons/Acre GYP (REQ)	LIME (Presence)	PPM B	NO_3N	PO_4P	K (AA)	Zn	Mn	Fe	Cu	SO_4S
1. Blk #8 12"	44	6.0	0.85	3.1	1.3	3.9	0.1	2.3	2.5		-	0.3	13.6							27
2. 24"	46	5.9	0.83	2.7	1.8	3.7	0.1	2.6	2.3		-	0.2	13.5							31
3. 36"	46	7.3	1.16	4.4	4.0	3.0	0.1	2.1	<1.0		+++	0.1	16.3							33
OPTIMUM RANGES		6.0- 7.5	<4.00 >0.60	(Ca > Mg + Na)			>0.4	<10	<5			>0.2 <1.5		>12.0	>150	>2.0	>5.0	>8.0	>1.0	>20

RED = LOW BLUE = HIGH DOMINANT SOLUBLE SALT IS UNDERLINED. SEE ENCLOSED INTERPRETATION GUIDES.

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SOIL ANALYSIS

Client: M.R.W.P.C.A.
#5 HARRIS COURT, Bldg D
MONTEREY, CALIFORNIA 93940-5756

Lab No.: 08-19S328 PO #000664
Sampled Date: 08-15-02
Submitted Date: 08-19-02
Report Date: 08-23-02
Submitted By: WILLIAM FRANKS

Material: SOIL -
RANCH: SAN JON RANCH - TEST SITE #4

DESCRIPTION	% SP	pH	EC dS/m	Ca (meq/L)	Mg (meq/L)	Na (meq/L)	K (meq/L)	Cl (meq/L)	ESP	Tons/Acre GYP - LIME REQ or Presence	B (PPM)	NO_3N (PPM)	PO_4P (PPM)	K AA (PPM)	Zn (PPM)	Mn (PPM)	Fe (PPM)	Cu (PPM)	SO_4S (PPM)
1. Blk #8 12"	56	6.1	1.75	7.0	3.4	6.6	0.5	2.6	3.0	-	0.4	27.8	46.2						50
2. 24"	55	6.4	1.24	4.5	3.5	4.2	0.1	1.9	1.8	-	0.3	14.9	8.1						48
3. 36"	54	7.6	1.70	8.3	4.5	4.0	0.2	1.8	1.0	+++	0.1	20.6	2.9						45
OPTIMUM RANGES		6.0- 7.5	<4.00 >0.60	(Ca > Mg + Na)			>0.4	<10	<5		>0.2 <1.5		>12.0	>150	>2.0	>5.0	>8.0	>1.0	>20

RED = LOW BLUE = HIGH DOMINANT SOLUBLE SALT IS UNDERLINED. SEE ENCLOSED INTERPRETATION GUIDES.

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SOIL ANALYSIS

Client: M.R.W.P.C.A.
#5 HARRIS COURT, Bldg D
MONTEREY, CALIFORNIA 93940-5756

Lab No.: 11-26S297 PO #000664
Sampled Date: 11-22-02
Submitted Date: 11-26-02
Report Date: 12-09-02
Submitted By: WILLIAM FRANKS

Material: SOIL -
RANCH: SAN JON RANCH - TEST SITE #6

DESCRIPTION	% SP	pH	EC dS/m	Ca (meq/L)	Mg (meq/L)	Na (meq/L)	K (meq/L)	Cl (meq/L)	ESP	GYP - LIME (Tons/Acre, REQ or Presence)	B (PPM)	NO_3N (PPM)	PO_4P (PPM)	K AA (PPM)	Zn (PPM)	Mn (PPM)	Fe (PPM)	Cu (PPM)	SO_4S (PPM)
1. Blk #8 12"	54	6.4	1.90	7.6	3.9	7.2	0.3	3.6	3.1	-	0.2	69.1							33
2. 24"	53	6.2	1.28	4.7	3.1	4.9	0.1	3.2	2.4	-	0.2	29.6							43
3. 36"	56	7.2	1.38	6.0	4.1	3.6	0.1	3.0	1.1	-	0.1	21.5							37
OPTIMUM RANGES		6.0-7.5	<4.00 >0.60	(Ca > Mg + Na)			>0.4	<10	<5		>0.2 <1.5		>12.0	>150	>2.0	>5.0	>8.0	>1.0	>20

RED = LOW BLUE = HIGH DOMINANT SOLUBLE SALT IS UNDERLINED. SEE ENCLOSED INTERPRETATION GUIDES.

IF YOU SHOULD HAVE ANY QUESTIONS, PLEASE CALL.

SAM MODESITT - CHEMIST

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SOIL ANALYSIS

Client: M.R.W.P.C.A.
#5 HARRIS COURT, Bldg D
MONTEREY, CALIFORNIA 93940-5756

Lab No.: 04-15S252 PO #000664
Sampled Date: 04-10-03
Submitted Date: 04-15-03
Report Date: 04-23-03
Submitted By: WILLIAM FRANKS

Material: SOIL -

RANCH: SAN JON RANCH - TEST SITE #4

DESCRIPTION	% SP	pH	EC dS/m	Ca (meq/L)	Mg (meq/L)	Na (meq/L)	K (meq/L)	Cl (meq/L)	ESP	T/ac GYP REQ	LIME PRESENCE LP	B (PPM)	NO_3N (PPM)	PO_4P (PPM)	K AA (PPM)	Zn (PPM)	Mn (PPM)	Fe (PPM)	Cu (PPM)	SO_4S (PPM)
1. Blk #8 12"	55	5.9	2.46	10.2	2.9	<u>11.2</u>	0.2	6.4	5.0		-	0.3	91.4							128
2. 24"	55	7.2	1.74	<u>6.9</u>	4.0	6.4	0.2	5.2	2.7		-	0.2	43.0							44
3. 36"	58	6.2	2.37	<u>9.5</u>	7.4	6.6	0.2	8.0	2.0		-	0.1	26.0							59
OPTIMUM RANGES		6.0-7.5	<4.00 >0.60	(Ca > Mg + Na)			>0.4	<10	<5			>0.2 <1.5		>12.0	>150	>2.0	>5.0	>8.0	>1.0	>20

RED = LOW BLUE = HIGH DOMINANT SOLUBLE SALT IS UNDERLINED. SEE ENCLOSED INTERPRETATION GUIDES.

IF YOU SHOULD HAVE ANY QUESTIONS, PLEASE CALL.

SAM MODESITT - CHEMIST

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SOIL ANALYSIS

Client: M.R.W.P.C.A.
#5 HARRIS COURT, Bldg D
MONTEREY, CALIFORNIA 93940-5756

Lab No.: 08-18S317 PO #001223
Sampled Date: 08-13-03
Submitted Date: 08-18-03
Report Date: 08-22-03
Submitted By: WILLIAM FRANKS

Material: SOIL -
RANCH: SAN JON RANCH - TEST SITE #4

DESCRIPTION	% SP	pH	EC dS/m	Ca (meq/L)	Mg (meq/L)	Na (meq/L)	K (meq/L)	Cl (meq/L)	ESP	T/ac GYP REQ	LIME PRESENCE LP	B (PPM)	NO_3N (PPM)	PO_4P (PPM)	K AA (PPM)	Zn (PPM)	Mn (PPM)	Fe (PPM)	Cu (PPM)	SO_4S (PPM)
1. Blk #8 12"	51	6.4	1.20	4.1	2.4	5.2	0.2	3.5	2.9		-	0.4	37.6							29
2. 24"	56	7.5	1.84	6.2	6.9	5.2	0.2	6.6	1.7		-	0.1	48.4							35
3. 36"	55	7.1	1.76	6.4	6.3	4.8	0.2	7.4	1.5		-	0.1	26.7							39
OPTIMUM RANGES		6.0- 7.5	<4.00 >0.60	(Ca > Mg + Na)			>0.4	<10	<5			>0.2 <1.5		>12.0	>150	>2.0	>5.0	>8.0	>1.0	>20

RED = LOW BLUE = HIGH DOMINANT SOLUBLE SALT IS UNDERLINED. SEE ENCLOSED INTERPRETATION GUIDES.

IF YOU SHOULD HAVE ANY QUESTIONS, PLEASE CALL.

SAM MODESITT - CHEMIST

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SOIL ANALYSIS

Client: M.R.W.P.C.A.
#5 HARRIS COURT, Bldg D
MONTEREY, CALIFORNIA 93940-5756

Lab No.: 10-28S553 PO #001223
Sampled Date: 10-24-03
Submitted Date: 10-28-03
Report Date: 11-06-03
Submitted By:

Material: SOIL -
RANCH: SAN JON RANCH - TEST SITE #4

DESCRIPTION	% SP	pH	EC dS/m	Ca (meq/L)	Mg (meq/L)	Na (meq/L)	K (meq/L)	Cl (meq/L)	ESP	T/ac GYP REQ	LIME PRESENCE LP	B (PPM)	NO_3N (PPM)	PO_4P (PPM)	K AA (PPM)	Zn (PPM)	Mn (PPM)	Fe (PPM)	Cu (PPM)	SO_4S (PPM)
1. Blk #8 12"	54	7.1	1.87	6.7	3.9	7.8	0.3	4.8	3.6		-	0.2	42.2							24
2. 24"	50	6.0	2.09	7.9	5.7	7.0	0.3	7.1	2.6		-	0.2	53.0							39
3. 36"	49	7.6	1.87	6.4	7.2	4.9	0.2	7.0	1.5		-	0.1	24.2							39
OPTIMUM RANGES		6.0- 7.5	<4.00 >0.60	(Ca > Mg + Na)			>0.4	<10	<5			>0.2 <1.5		>12.0	>150	>2.0	>5.0	>8.0	>1.0	>20

RED = LOW BLUE = HIGH DOMINANT SOLUBLE SALT IS UNDERLINED. SEE ENCLOSED INTERPRETATION GUIDES.

IF YOU SHOULD HAVE ANY QUESTIONS, PLEASE CALL.

SAM MODESITT - CHEMIST

Valley Tech

AGRICULTURAL LABORATORY SERVICES

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SOIL ANALYSIS

Client: M.R.W.P.C.A.
#5 HARRIS COURT, Bldg D
MONTEREY, CALIFORNIA 93940-5756

Lab No.: 03-17S216 PO #001223
Sampled Date: 03-13-04
Submitted Date: 03-17-04
Report Date: 03-29-04
Submitted By: B. FRANKS

Material: SOIL -

RANCH: SAN JON RANCH - TEST SITE #4

DESCRIPTION	% SP	pH	EC dS/m	meq/L Ca	meq/L Mg	meq/L Na	meq/L K	meq/L Cl	ESP	T/ac GYP REQ	LIME PRESENCE LP	PPM B	PPM NO_3N	PPM PO_4P	PPM K AA	PPM Zn	PPM Mn	PPM Fe	PPM Cu	PPM SO_4S
1. Blk #8 12"	57	6.3	1.17	3.9	2.4	5.3	0.2	3.3	3.1		-	0.2	34.2							28
2. 24"	55	6.2	0.95	3.2	2.1	4.6	0.1	3.5	2.9		-	0.2	35.7							31
3. 36"	58	7.2	1.38	5.8	5.0	4.3	0.1	4.7	1.5		++	0.1	41.1							43
OPTIMUM RANGES		6.0- 7.5	<4.00 >0.60	(Ca > Mg + Na)			>0.4	<10	<5			>0.2 <1.5		>12.0	>150	>2.0	>5.0	>8.0	>1.0	>50

RED = LOW BLUE = HIGH DOMINANT SOLUBLE SALT IS UNDERLINED. SEE ENCLOSED INTERPRETATION GUIDES.

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SOIL ANALYSIS

Client: M.R.W.P.C.A.
#5 HARRIS COURT, Bldg D
MONTEREY, CALIFORNIA 93940-5756

Lab No.: 09-02S035 PO #001785
Sampled Date: 08-31-04
Submitted Date: 09-02-04
Report Date: 09-21-04
Submitted By:

Material: SOIL -
RANCH: SAN JON RANCH - TEST SITE #4

DESCRIPTION	% SP	pH	EC dS/m	Ca (meq/L)	Mg (meq/L)	Na (meq/L)	K (meq/L)	Cl (meq/L)	ESP	T/ac GYP REQ	LIME PRESENCE LP	B (PPM)	NO_3N (PPM)	PO_4P (PPM)	K AA (PPM)	Zn (PPM)	Mn (PPM)	Fe (PPM)	Cu (PPM)	SO_4S (PPM)
1. Blk #8 12"	60	6.5	1.10	4.0	1.7	<u>6.1</u>	0.1	4.3	4.0		-	0.2	31.1							35
2. 24"	64	6.6	1.36	4.9	3.8	<u>5.4</u>	0.2	8.3	2.5		-	0.1	52.9							40
3. 36"	66	7.3	1.49	<u>6.0</u>	5.3	4.4	0.1	8.3	1.5		+	0.1	32.7							43
OPTIMUM RANGES		6.0- 7.5	<4.00 >0.60	(Ca > Mg + Na)			>0.4	<10	<5			>0.2 <1.5		>12.0	>150	>2.0	>5.0	>8.0	>1.0	>50

RED = LOW BLUE = HIGH <u>DOMINANT SOLUBLE SALT IS UNDERLINED</u>. SEE ENCLOSED INTERPRETATION GUIDES.

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SOIL ANALYSIS

Client: M.R.W.P.C.A.
#5 HARRIS COURT, Bldg D
MONTEREY, CALIFORNIA 93940-5756

Lab No.: 12-02S018 PO #001785
Sampled Date: 12-01-04
Submitted Date: 12-02-04
Report Date: 12-08-04
Submitted By: W. FRANKS

Material: SOIL -

RANCH: SAN JON RANCH - TEST SITE #4

	%			------------	meq/L	------------				T/ac	LIME	------------	------------	------------	PPM	------------	------------	------------	------------	------------
	SP	pH	EC	Ca	Mg	Na	K	Cl	ESP	GYP	PRESENCE	B	NO_3N	PO_4P	K	Zn	Mn	Fe	Cu	SO_4S
DESCRIPTION			dS/m							REQ	LP				AA					
1. Blk #8 12"	55	6.0	1.45	5.2	2.4	6.6	0.3	4.1	3.6		-	0.3	54.8							22
2. 24"	54	6.1	1.70	5.8	4.6	6.4	0.1	8.0	2.8		-	0.2	67.2							33
3. 36"	58	7.4	1.63	6.2	5.8	4.8	0.1	6.7	1.6		++	0.1	42.8							40
OPTIMUM RANGES		6.0-7.5	<4.00 >0.60	(Ca > Mg + Na)			>0.4	<10	<5			>0.2 <1.5		>12.0	>150	>2.0	>5.0	>8.0	>1.0	>50

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SOIL ANALYSIS

Client: M.R.W.P.C.A.
#5 HARRIS COURT, Bldg D
MONTEREY, CALIFORNIA 93940-5756

Lab No.: 04-28S556 PO #001785
Sampled Date: 04-26-05
Submitted Date: 04-28-05
Report Date: 05-10-05
Submitted By: WILLIAM FRANKS

Material: SOIL -
RANCH: SAN JON RANCH - TEST SITE #4

DESCRIPTION	% SP	pH	EC dS/m	Ca (meq/L)	Mg (meq/L)	Na (meq/L)	K (meq/L)	Cl (meq/L)	ESP	T/ac GYP REQ	LIME PRESENCE LP	B (PPM)	NO_3N (PPM)	PO_4P (PPM)	K AA (PPM)	Zn (PPM)	Mn (PPM)	Fe (PPM)	Cu (PPM)	SO_4S (PPM)
1. Blk #8 12"	49	6.0	0.76	2.7	0.8	<u>4.2</u>	0.1	5.5	3.3		-	0.1	21.3							11
2. 24"	46	6.6	0.72	2.0	1.5	<u>3.8</u>	0.1	4.5	2.9		-	0.1	10.5							22
3. 36"	49	7.3	1.51	<u>7.6</u>	6.4	4.9	0.1	8.3	1.5		-	0.1	15.6							40
OPTIMUM RANGES		6.0- 7.5	<4.00 >0.60	(Ca > Mg + Na)			>0.4	<10	<5			>0.2 <1.5		>12.0	>150	>2.0	>5.0	>8.0	>1.0	>50

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SOIL ANALYSIS

Client: M.R.W.P.C.A.
#5 HARRIS COURT, Bldg D
MONTEREY, CALIFORNIA 93940-5756

Lab No.: 04-28S556 PO #001785
Sampled Date: 04-26-05
Submitted Date: 04-28-05
Report Date: 05-10-05
Submitted By: WILLIAM FRANKS

Material: SOIL -
RANCH: SAN JON RANCH - TEST SITE #4

DESCRIPTION	% SP	pH	EC dS/m	Ca (meq/L)	Mg (meq/L)	Na (meq/L)	K (meq/L)	Cl (meq/L)	ESP	T/ac GYP REQ	LIME PRESENCE LP	B (PPM)	NO_3N (PPM)	PO_4P (PPM)	K AA (PPM)	Zn (PPM)	Mn (PPM)	Fe (PPM)	Cu (PPM)	SO_4S (PPM)
1. Blk #8 12"	49	6.0	0.76	2.7	0.8	<u>4.2</u>	0.1	5.5	3.3		-	0.1	21.3							11
2. 24"	46	6.6	0.72	2.0	1.5	<u>3.8</u>	0.1	4.5	2.9		-	0.1	10.5							22
3. 36"	49	7.3	1.51	<u>7.6</u>	6.4	4.9	0.1	8.3	1.5		-	0.1	15.6							40
OPTIMUM RANGES		6.0-7.5	<4.00 >0.60	(Ca > Mg + Na)			>0.4	<10	<5			>0.2 <1.5		>12.0	>150	>2.0	>5.0	>8.0	>1.0	>50

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SOIL ANALYSIS

Client: M.R.W.P.C.A.
#5 HARRIS COURT, Bldg D
MONTEREY, CALIFORNIA 93940-5756

Lab No.: 08-17S276 PO #002409
Sampled Date: 08-12-05
Submitted Date: 08-17-05
Report Date: 08-25-05
Submitted By: W. FRANKS

Material: SOIL -
RANCH: SAN JON RANCH - TEST SITE #4

	%			------------	meq/L	--------	--------	------------		T/ac	LIME	------------	------------	------------	PPM	------------	------------	------------	------------	------------
DESCRIPTION	SP	pH	EC dS/m	Ca	Mg	Na	K	Cl	ESP	GYP REQ	PRESENCE LP	B	NO_3N	PO_4P	K AA	Zn	Mn	Fe	Cu	SO_4S
1. Blk #8 12"	58	6.2	1.69	5.1	3.1	8.8	0.2	8.7	4.9		-	0.5	41.2							36
2. 24"	56	7.1	1.58	5.2	4.1	7.2	0.1	7.3	3.5		-	0.2	15.5							47
3. 36"	59	7.8	1.73	5.9	5.7	6.0	0.2	9.4	2.3		+++	0.2	13.7							53
OPTIMUM RANGES		6.0-7.5	<4.00 >0.60	(Ca > Mg + Na)			>0.4	<10	<5			>0.2 <1.5		>12.0	>150	>2.0	>5.0	>8.0	>1.0	>50

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SOIL ANALYSIS

Client: M.R.W.P.C.A.
#5 HARRIS COURT, Bldg D
MONTEREY, CALIFORNIA 93940-5756

Material: SOIL -
RANCH: SAN JON RANCH - TEST SITE #4

Lab No.: 05-15S278 PO #002409
Sampled Date: 05-09-06
Submitted Date: 05-15-06
Report Date: 05-19-06
Submitted By: W. FRANKS

DESCRIPTION	% SP	pH	EC dS/m	Ca (meq/L)	Mg (meq/L)	Na (meq/L)	K (meq/L)	Cl (meq/L)	ESP	T/ac GYP REQ	LIME PRESENCE LP	B (PPM)	NO_3N (PPM)	PO_4P (PPM)	K AA (PPM)	Zn (PPM)	Mn (PPM)	Fe (PPM)	Cu (PPM)	SO_4S (PPM)
1. Blk #8 12"	49.6	6.2	1.46	3.3	1.0	<u>10.2</u>	0.3	7.9	8.3		-	0.6	16.4							45
2. 24"	49.4	6.4	2.02	4.5	2.3	<u>13.6</u>	0.2	12.6	8.7		-	0.7	13.6							86
3. 36"	47.6	7.2	2.22	<u>9.3</u>	5.1	7.8	0.2	13.6	2.9		-	0.2	26.3							70
OPTIMUM RANGES		6.0-7.5	<4.00 >0.60	(Ca > Mg + Na)			>0.4	<10	<5			>0.2 <1.5		>12.0	>150	>2.0	>5.0	>8.0	>1.0	>50

RED = LOW BLUE = HIGH <u>DOMINANT SOLUBLE SALT IS UNDERLINED</u>. SEE ENCLOSED INTERPRETATION GUIDES.

IF YOU SHOULD HAVE ANY QUESTIONS, PLEASE CALL.

SAM MODESITT - CHEMIST

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SOIL ANALYSIS

Client: M.R.W.P.C.A.
#5 HARRIS COURT, Bldg D
MONTEREY, CALIFORNIA 93940-5756

Lab No.: 08-30S456 PO #002409
Sampled Date: 08-25-06
Submitted Date: 08-30-06
Report Date: 09-07-06
Submitted By: W. FARNKS

Material: SOIL -
RANCH: SAN JON RANCH - TEST SITE #4

DESCRIPTION		% SP	pH	EC dS/m	Ca (meq/L)	Mg (meq/L)	Na (meq/L)	K (meq/L)	Cl (meq/L)	ESP	T/ac GYP REQ	LIME PRESENCE LP	B (PPM)	NO_3N (PPM)	PO_4P (PPM)	K AA (PPM)	Zn (PPM)	Mn (PPM)	Fe (PPM)	Cu (PPM)	SO_4S (PPM)
1. Blk #8	12"	46	6.8	1.31	4.4	1.5	7.3	0.2	4.7	4.8		-	0.3	40.2							80
2.	24"	47	6.5	1.77	7.9	2.9	7.5	0.2	5.5	3.4		-	0.2	48.4							60
3.	36"	57	7.5	1.47	4.8	3.8	6.1	0.2	7.0	3.0		++	0.2	30.8							58
OPTIMUM RANGES			6.0- 7.5	<4.00 >0.60	(Ca > Mg + Na)			>0.4	<10	<5			>0.2 <1.5		>12.0	>150	>2.0	>5.0	>8.0	>1.0	>50

RED = LOW BLUE = HIGH DOMINANT SOLUBLE SALT IS UNDERLINED. SEE ENCLOSED INTERPRETATION GUIDES.

IF YOU SHOULD HAVE ANY QUESTIONS, PLEASE CALL.

SAM MODESITT - CHEMIST

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SOIL ANALYSIS

Client: M.R.W.P.C.A.
#5 HARRIS COURT, Bldg D
MONTEREY, CALIFORNIA 93940-5756

Lab No.: 11-15S194 PO #002409
Sampled Date: 11-09-06
Submitted Date: 11-15-06
Report Date: 12-05-06
Submitted By: WILLIAM FRANKS

Material: SOIL -
RANCH: SAN JON RANCH - TEST SITE #4

DESCRIPTION	% SP	pH	EC dS/m	meq/L Ca	meq/L Mg	meq/L Na	meq/L K	meq/L Cl	ESP	T/ac GYP REQ	LIME PRESENCE LP	PPM B	PPM NO_3N	PPM PO_4P	PPM K AA	PPM Zn	PPM Mn	PPM Fe	PPM Cu	PPM SO_4S
1. Blk #8 12"	59	6.3	2.45	<u>11.8</u>	3.8	9.2	0.3	4.9	3.5		-	0.3	85.6							118
2. 24"	66	7.4	1.91	<u>7.8</u>	3.5	6.8	0.1	4.8	2.9		++++	0.1	42.5							75
3. 36"	65	7.9	1.42	<u>6.4</u>	2.5	4.4	0.1	4.7	1.8		++++	0.1	41.3							54
OPTIMUM RANGES		6.0- 7.5	<4.00 >0.60	(Ca > Mg + Na)			>0.4	<10	<5			>0.2 <1.5		>12.0	>150	>2.0	>5.0	>8.0	>1.0	>50

RED = LOW BLUE = HIGH DOMINANT SOLUBLE SALT IS UNDERLINED. SEE ENCLOSED INTERPRETATION GUIDES.

IF YOU SHOULD HAVE ANY QUESTIONS, PLEASE CALL.

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SOIL ANALYSIS

Client: M.R.W.P.C.A.
#5 HARRIS COURT, Bldg D
MONTEREY, CALIFORNIA 93940-5756

Lab No.: 05-03S085 PO #002409
Sampled Date: 04-26-07
Submitted Date: 05-03-07
Report Date: 05-14-07
Submitted By: WILLIAM FRANK

Material: SOIL -
RANCH: SAN JON RANCH - TEST SITE #4

DESCRIPTION	% SP	pH	EC dS/m	Ca (meq/L)	Mg (meq/L)	Na (meq/L)	K (meq/L)	Cl (meq/L)	ESP	T/ac GYP REQ	LIME PRESENCE LP	B (PPM)	NO_3N (PPM)	PO_4P (PPM)	K AA (PPM)	Zn (PPM)	Mn (PPM)	Fe (PPM)	Cu (PPM)	SO_4S (PPM)
1. Blk #8 12"	52	6.2	0.90	3.0	1.6	3.8	0.2	3.3	2.4		-	0.3	15.2							55
2. 24"	54	6.7	1.45	6.2	3.2	5.7	0.1	5.1	2.6		-	0.2	23.6							113
3. 36"	53	7.8	1.83	7.3	5.2	5.3	0.1	6.7	1.8		++++	0.1	39.8							82
OPTIMUM RANGES		6.0- 7.5	<4.00 >0.60	(Ca > Mg + Na)			>0.4	<10	<5			>0.2 <1.5		>12.0	>150	>2.0	>5.0	>8.0	>1.0	>50

RED = LOW BLUE = HIGH DOMINANT SOLUBLE SALT IS UNDERLINED. SEE ENCLOSED INTERPRETATION GUIDES.

IF YOU SHOULD HAVE ANY QUESTIONS, PLEASE CALL.

SAM MODESITT - CHEMIST

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SOIL ANALYSIS

Client: M.R.W.P.C.A.
#5 HARRIS COURT, Bldg D
MONTEREY, CALIFORNIA 93940-5756

Lab No.: 08-30S535 PO #002409
Sampled Date: 08-24-07
Submitted Date: 08-30-07
Report Date: 09-07-07
Submitted By: WILLIAM FRANKS

Material: SOIL -
RANCH: SAN JON RANCH TEST Site 4

DESCRIPTION	% SP	pH	EC dS/m	Ca (meq/L)	Mg (meq/L)	Na (meq/L)	K (meq/L)	Cl (meq/L)	ESP	T/ac GYP REQ	LIME PRESENCE LP	B (PPM)	NO_3N (PPM)	PO_4P (PPM)	K AA (PPM)	Zn (PPM)	Mn (PPM)	Fe (PPM)	Cu (PPM)	SO_4S (PPM)
1. Blk #8 12"	55	6.3	2.12	9.2	4.4	7.8	0.2	4.0	3.0		-	0.2	65.4							96
2. 24"	62	7.4	1.87	7.5	4.9	6.7	0.1	5.8	2.7		++	0.1	28.3							102
3. 36"	63	7.9	1.64	6.9	4.6	5.3	0.1	6.7	1.9		++++	0.1	29.3							85
OPTIMUM RANGES		6.0-7.5	<4.00 >0.60	(Ca > Mg + Na)			>0.4	<10	<5			>0.2 <1.5		>12.0	>150	>2.0	>5.0	>8.0	>1.0	>50

RED = LOW BLUE = HIGH DOMINANT SOLUBLE SALT IS UNDERLINED. SEE ENCLOSED INTERPRETATION GUIDES.

IF YOU SHOULD HAVE ANY QUESTIONS, PLEASE CALL.

SAM MODESITT - CHEMIST

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SOIL ANALYSIS

Client: M.R.W.P.C.A.
#5 HARRIS COURT, Bldg D
MONTEREY, CALIFORNIA 93940-5756

Lab No.: 10-25S626 PO #003859
Sampled Date: 10-25-07
Submitted Date: 10-25-07
Report Date: 11-13-07
Submitted By: W. FRANKS

Material: SOIL -
RANCH: SAN JON RANCH - TEST SITE #4

DESCRIPTION		% SP	pH	EC dS/m	Ca (meq/L)	Mg (meq/L)	Na (meq/L)	K (meq/L)	Cl (meq/L)	ESP	T/ac GYP REQ	LIME PRESENCE LP	B (PPM)	NO_3N (PPM)	PO_4P (PPM)	K AA (PPM)	Zn (PPM)	Mn (PPM)	Fe (PPM)	Cu (PPM)	SO_4S (PPM)
1. Blk #8	12"	50	6.3	1.85	8.8	5.5	8.2	0.4	5.0	3.2		-	0.4	82.6							64
2.	24"	47	6.5	1.91	9.1	6.0	8.2	0.2	7.4	3.1		-	0.2	47.1							124
3.	36"	44	7.9	1.61	8.0	6.1	5.6	0.1	6.3	1.8		+++	0.1	35.9							85
OPTIMUM RANGES			6.0- 7.5	<4.00 >0.60	(Ca > Mg + Na)			>0.4	<10	<5			>0.2 <1.5		>12.0	>150	>2.0	>5.0	>8.0	>1.0	>50

RED = LOW BLUE = HIGH DOMINANT SOLUBLE SALT IS UNDERLINED. SEE ENCLOSED INTERPRETATION GUIDES.

IF YOU SHOULD HAVE ANY QUESTIONS, PLEASE CALL.

SAM MODESITT - CHEMIST

Valley Tech
AGRICULTURAL LABORATORY SERVICES

2120 South 'K' Street
Tulare, California 93274
Office: 559 - 688-5684
Fax: 559 - 688-5768

SOIL ANALYSIS

Client: M.R.W.P.C.A.
#5 HARRIS COURT, Bldg D
MONTEREY, CALIFORNIA 93940-5756

Lab No.: 03-18S203 PO #003859
Sampled Date: 03-11-08
Submitted Date: 03-18-08
Report Date: 03-28-08
Submitted By: WILLIAM FRANKS

Material: SOIL -
RANCH: SAN JON RANCH - TEST SITE #4

DESCRIPTION	% SP	pH	EC dS/m	meq/L Ca	meq/L Mg	meq/L Na	meq/L K	meq/L Cl	ESP	T/ac GYP REQ	LIME PRESENCE LP	PPM B	PPM NO_3N	PPM PO_4P	PPM K AA	PPM Zn	PPM Mn	PPM Fe	PPM Cu	PPM SO_4S
1. Blk #8 12"	50	6.6	1.82	6.4	3.4	<u>8.7</u>	0.3	4.7	4.3		-	0.3	40.8							77
2. 24"	58	6.8	2.58	<u>10.4</u>	6.9	9.0	0.2	5.9	3.2		-	0.1	38.9							103
3. 36"	57	7.6	2.33	<u>9.4</u>	6.9	7.0	0.2	6.8	2.3		++++	0.1	46.0							104
OPTIMUM RANGES		6.0- 7.5	<4.00 >0.60	(Ca > Mg + Na)			>0.4	<10	<5			>0.2 <1.5		>12.0	>150	>2.0	>5.0	>8.0	>1.0	>50

RED = LOW BLUE = HIGH <u>DOMINANT SOLUBLE SALT IS UNDERLINED</u>. SEE ENCLOSED INTERPRETATION GUIDES.

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Tulare, California 93274
Office: 559 - 688-5684
Fax: 559 - 688-5768

SOIL ANALYSIS

Client: M.R.W.P.C.A.
#5 HARRIS COURT, Bldg D
MONTEREY, CALIFORNIA 93940-5756

Lab No.: 08-11S183 PO #004430
Sampled Date: 08-07-08
Submitted Date: 08-11-08
Report Date: 08-01-08
Submitted By: WILLIAM FRANKS

Material: SOIL -
RANCH: SAN JON RANCH - TEST SITE #4

	%			------------	meq/L	--------------				T/ac	LIME	-------------	-------------	-------------	PPM	-------------	-------------	-------------	-------------	-------------
	SP	pH	EC	Ca	Mg	Na	K	Cl	ESP	GYP	PRESENCE	B	NO_3N	PO_4P	K	Zn	Mn	Fe	Cu	SO_4S
DESCRIPTION			dS/m							REQ	LP				AA					
1. Blk #8 12"	35	6.6	0.64	1.8	1.0	<u>3.3</u>	0.1	2.3	2.8		-	0.2	12.0							27
2. 24"	37	7.1	1.01	3.6	1.7	<u>5.0</u>	0.1	3.0	3.2		+	0.1	9.9							48
3. 36"	36	7.8	1.18	3.8	3.2	<u>4.6</u>	0.1	3.8	2.3		++	0.1	16.2							62
OPTIMUM RANGES		6.0-7.5	<4.00 >0.60	(Ca > Mg + Na)			>0.4	<10	<5			>0.2 <1.5		>12.0	>150	>2.0	>5.0	>8.0	>1.0	>50

RED = LOW BLUE = HIGH DOMINANT SOLUBLE SALT IS UNDERLINED. SEE ENCLOSED INTERPRETATION GUIDES.

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AGRICULTURAL LABORATORY SERVICES

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Tulare, California 93274
Office: 559 - 688-5684
Fax: 559 - 688-5768

SOIL ANALYSIS

Client:	M.R.W.P.C.A. #5 HARRIS COURT, Bldg D MONTEREY, CALIFORNIA 93940-5756	**Lab No.:**	11-20S414 PO #004430
		Sampled Date:	11-20-08
		Submitted Date:	11-20-08
		Report Date:	12-04-08
Material:	SOIL -	**Submitted By:**	WILLIAM FRANKS

RANCH: SAN JON RANCH - TEST SITE #4

DESCRIPTION	% SP	pH	EC dS/m	meq/L Ca	meq/L Mg	meq/L Na	meq/L K	meq/L Cl	ESP	T/ac GYP REQ	LIME PRESENCE LP	PPM B	PPM NO_3N	PPM PO_4P	PPM K AA	PPM Zn	PPM Mn	PPM Fe	PPM Cu	PPM SO_4S
1. Blk #8 12"	53	5.7	2.33	7.9	4.7	<u>10.0</u>	0.4	8.5	4.4		-	0.5	88.4							186
2. 24"	48	6.4	1.68	5.3	3.9	<u>6.9</u>	0.1	7.5	3.4		-	0.2	31.1							134
3. 36"	53	7.5	1.76	5.5	5.4	<u>6.5</u>	0.1	6.7	2.8		+++	0.1	33.1							141
OPTIMUM RANGES		6.0- 7.5	<4.00 >0.60	(Ca > Mg + Na)			>0.4	<10	<5			>0.2 <1.5		>12.0	>150	>2.0	>5.0	>8.0	>1.0	>50

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Valley Tech
AGRICULTURAL LABORATORY SERVICES

2120 South 'K' Street
Tulare, California 93274
Office: 559 - 688-5684
Fax: 559 - 688-5768

SOIL ANALYSIS

Client: M.R.W.P.C.A.
#5 HARRIS COURT, Bldg D
MONTEREY, CALIFORNIA 93940-5756

Lab No.: 04-02S023 PO #004430
Sampled Date: 03-30-09
Submitted Date: 04-01-09
Report Date: 04-08-09
Submitted By: WILLIAM FRANKS

Material: SOIL
SITE: SAN JON RANCH - TEST SITE #4 - BLOCK 8

DESCRIPTION		% SP	pH	EC dS/m	Ca (meq/L)	Mg (meq/L)	Na (meq/L)	K (meq/L)	Cl (meq/L)	ESP	T/ac GYP REQ	LIME PRESENCE LP	B (PPM)	NO_3N (PPM)	SO_4S (PPM)	Mo DTPA (PPM)
1. Blk #8	12"	38	6.5	0.53	1.2	0.7	<u>3.4</u>	0.1	2.8	3.7		-	0.3	8.8	21	0.04
2.	24"	47	6.4	0.56	1.3	0.9	<u>3.2</u>	0.1	3.3	3.1		-	0.2	12.5	25	<0.04
3.	36"	50	6.9	1.20	3.8	4.0	<u>5.2</u>	0.1	4.5	2.5		+	0.1	20.5	55	<0.04
OPTIMUM RANGES			6.0-7.5	<4.00 >0.60	(Ca > Mg + Na)			>0.4	<10	<5			>0.2 <1.5		>50	

RED = LOW BLUE = HIGH DOMINANT SOLUBLE SALT IS UNDERLINED. SEE ENCLOSED INTERPRETATION GUIDES.

IF YOU SHOULD HAVE ANY QUESTIONS, PLEASE CALL.

SAM MODESITT - CHEMIST

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Fax: 559 - 688-5768

SOIL ANALYSIS

Client: M.R.W.P.C.A.
#5 HARRIS COURT, Bldg D
MONTEREY, CALIFORNIA 93940-5756

Lab No.: 07-24S557 PO #004430
Sampled Date: 07-24-09
Submitted Date: 07-24-09
Report Date: 07-29-09
Submitted By: WILLIAM FRANKS

Material: SOIL
SITE: SAN JON RANCH - TEST SITE #4 - Blk #8

DESCRIPTION		% SP	pH	EC dS/m	Ca (meq/L)	Mg (meq/L)	Na (meq/L)	K (meq/L)	Cl (meq/L)	ESP	T/ac GYP REQ	LIME PRESENCE LP	B (PPM)	NO_3N (PPM)	SO_4S (PPM)	Mo DTPA (PPM)
1. Blk #8	12"	56	6.5	2.12	6.4	3.4	13.3	0.3	11.3	7.1		-	0.3	22.1	50	0.04
2.	24"	54	7.0	1.64	4.8	3.7	9.1	0.1	6.1	5.0		-	0.1	10.2	29	<0.04
3.	36"	52	7.7	1.76	5.5	5.4	7.4	0.1	7.1	3.3		++++	0.1	12.7	69	<0.04
OPTIMUM RANGES			6.0-7.5	<4.00 >0.60	(Ca > Mg + Na)			>0.4	<10	<5			>0.2 <1.5		>50	

RED = LOW BLUE = HIGH DOMINANT SOLUBLE SALT IS UNDERLINED. SEE ENCLOSED INTERPRETATION GUIDES.

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SAM MODESITT - CHEMIST

Valley Tech

AGRICULTURAL LABORATORY SERVICES

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Tulare, California 93274
Office: 559 - 688-5684
Fax: 559 - 688-5768

SOIL ANALYSIS

Client: M.R.W.P.C.A.
#5 HARRIS COURT, Bldg D
MONTEREY, CALIFORNIA 93940-5756

Lab No.: 10-30S981 PO #005131
Sampled Date: 10-26-09
Submitted Date: 10-30-09
Report Date: 11-18-09
Submitted By: WILLIAM FRANKS

Material: SOIL
SITE: SAN JON RANCH - TEST SITE #4 - Block 8

DESCRIPTION			% SP	pH	EC dS/m	Ca (meq/L)	Mg (meq/L)	Na (meq/L)	K (meq/L)	Cl (meq/L)	ESP	T/ac GYP REQ	LIME PRESENCE LP	B (PPM)	NO_3N (PPM)	SO_4S (PPM)	Mo DTPA (PPM)
1.	Blk 8	12"	36	6.6	0.97	3.3	1.3	5.1	0.2	4.2	3.6		-	0.2	24.7	21	0.42
2.		24"	41	6.6	1.62	4.7	3.3	8.3	0.1	9.2	4.6		-	0.2	22.9	37	0.23
3.		36"	40	7.6	1.87	6.5	6.2	7.4	0.1	9.7	3.0		++++	0.1	23.1	55	0.11
OPTIMUM RANGES				6.0- 7.5	<4.00 >0.60	(Ca > Mg + Na)			>0.4	<10	<5			>0.2 <1.5		>50	

RED = LOW BLUE = HIGH DOMINANT SOLUBLE SALT IS UNDERLINED. SEE ENCLOSED INTERPRETATION GUIDES.

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SAM MODESITT - CHEMIST

C.3: Soil Salinity Data Sample Calculations

EXAMPLE SAR CALCULATION

$$SAR = \frac{[Na^+]}{\sqrt{\frac{[Ca^{2+}] + [Mg^{2+}]}{2}}} \qquad [\ ] = meq/L$$

TEST SITE 1
NOVEMBER 4, 2009
1-12 INCH SOIL PROFILE

$Na^+ = 8.70$ meq/L $\quad Ca^{2+} = 9.50$ meq/L $\quad Mg^{2+} = 3.90$ meq/L

$$SAR = \frac{8.70}{\sqrt{\frac{9.50 + 3.90}{2}}} = \underline{3.36}$$

EXAMPLE ESP CALCULATION

$$ESP = \frac{100 \times [(SAR \times 0.01475) - 0.0126]}{1 + [(SAR \times 0.01475) - 0.0126]}$$

SAR = 3.36 (from above)

$$ESP = \frac{100 \times [(3.36 \times 0.01475) - 0.0126]}{1 + [(3.36 \times 0.01475) - 0.0126]} = \underline{3.57\%}$$

Appendix D: Rain Data

D.1: Rainfall and Evapotranspiration Data

Station Detail Report

The **Station Detail Report** provides detailed information on CIMIS stations including the region in w hich they are located, nearby city, installation dates, termination dates (if inactive), geographic locations (latitude and longitude), elevations above see level, zip codes, surface types (grass or alfalfa), station site descriptions, and photographs of the stations.

Castroville #19

Monterey Bay Region Monterey County San Joaquin District
Nearby city is Castroville

- Activated On November 18, 1982
- Station is Active
- ETo Reported
- Reference Surface is Grass
- Datalogger is CR10

Station 19
North | South | East | West |

Geographic Information

Elevation (ft):	9
Latitude:	36°46'05"N / 36.77
Longitude:	121°46'25"W / -121.77

Associated Zip Codes

93907, 93908, 93933, 95012, 95039

Station Siting Description

DATE: 11-12-02

STATION#:19
STATION NAME: Castroville
ETO ZONE: 2
PREVAILING WINDS: W-NW
LOCAL CHARACTER: This is a year-round intensively farmed agricultural area. Primary crops include artichokes, straw berries, salad ingredients and brussel sprouts.

DESCRIPTION OF STATION SITE:
The station is located in a set-aside portion of an artichoke field adjacent to Tembladero Slough w hich is tidal field drain conduit. It has a small grass plot.

NORTH:
25ft: Poorly maintained grass

25-100ft: Farm road -- unpaved
100-200ft: Tembladero Slough and unpaved farm road on further bank

EAST :
25ft: Poorly maintained grass

25-50ft: Farm road � unpaved
50-300+ft: Artichoke field

SOUTH:
25ft: Poorly maintained grass
25-300+ft: Artichoke field

WEST:
25ft: Poorly maintained grass
25-300+ft: Artichoke field

COMMENTS:
For most of the year, this site (and ETo) is influenced almost entirely by the movement of the marine layer. Monterey Bay lies approximately one mile to the Northw est.

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Monthly Report

California Irrigation Management Information System
Department of Water Resources
Office of Water Use Efficiency
Rendered in ENGLISH units
January 1, 2000 - December 31, 2009
Printed on June 15, 2013

Monterey Bay - Castroville - 19

Date	Tot ETo (in)	Tot Precip (in)	Avg Sol Rad (Ly/Day)	Avg Vap Pres (mBars)	Avg Max Air Tmp (F)	Avg Min Air Tmp (F)	Avg Air Tmp (F)	Avg Max Rel Hum (%)	Avg Min Rel Hum (%)	Avg Rel Hum (%)	Avg Dew Point (F)	Avg Wind Speed (mph)	Avg Soil Temp (F)
Jan 2000	0.92 K	5.78	137	11.6 K	58.2	41.7 K	49.7	100	75	93 K	47.9 K	4.6	52.0
Feb 2000	1.58	5.22	221	12.3	60.3	45.3	52.4	99	75	91	49.9	6.0 K	54.8
Mar 2000	3.24 K	1.84	405 K	11.1 L	59.5 K	40.5	50.3	100	70	89 L	47.0 L	5.4 K	53.9
Apr 2000	4.53 K	0.49 L	555 L	12.0 L	62.4 L	43.3 L	53.6 L	99	68	86 L	49.2 L	6.4 L	58.5 L
May 2000	4.94 K	0.26 K	574	13.2 L	63.3 K	46.1 K	55.8 K	99 K	73 K	87 L	51.8 L	6.9	62.3
Jun 2000	4.27 K	0.07	510	14.2 L	62.7 L	51.5 L	57.4 K	99 K	76 K	88 L	53.7 L	7.4 K	67.1
Jul 2000	3.88 K	0.01	451	14.8	62.5	51.9 K	57.0	100	82	93	55.1	6.2 K	67.6
Aug 2000	3.63 K	0.04	445	15.7	63.0	52.6 K	57.4	100	87	97	56.7	5.0 K	68.7
Sep 2000	3.69 K	0.11	441	15.3 L	67.1 K	51.1 K	59.2 K	98 K	74 K	89 L	55.8 L	4.8 K	67.8
Oct 2000	2.30 K	2.04	271	13.2 K	63.6	49.2	56.0	95	72	86 K	51.6 K	4.4	63.2
Nov 2000	1.92	0.37	264	10.0	60.4	38.5	48.5	97	63	86	44.3	4.2	53.5
Dec 2000	1.90	0.36	205	9.6	63.7 K	39.9 K	50.4	94	54	77	43.0	4.4	52.1
Jan 2001	1.81	3.57	225	8.5	59.3 K	36.3	46.9	94	54	77	39.9	5.0 K	48.7
Feb 2001	2.21	3.50	296 K	9.6 K	58.6 K	41.0	49.3	95	61	80 K	43.2 K	6.0 K	50.9
Mar 2001	3.09 K	1.60 K	387 K	12.1	60.4 K	45.0	52.9	96	75	88	49.5	4.9 K	57.4 K
Apr 2001	3.92 K	0.01 L	531 L	11.6 L	59.5 L	41.3 L	52.8 L	93 K	74 K	84 L	48.2 L	6.3 L	59.2 L
May 2001	5.09 K	0.03 K	564	13.1 L	64.7 K	47.5 K	56.8 K	96 K	68 K	85 L	51.7 L	6.2	65.8 L
Jun 2001	5.61	0.00	624	13.3	65.3 K	49.8	57.5	94	68	82	52.0	7.3 K	69.7 K
Jul 2001	3.72	0.00	416	14.7 L	63.3	54.5 L	58.6	94	80	87 L	54.8 L	6.1 K	67.9
Aug 2001	3.76	0.00	443	15.3	64.0	53.0	58.2	98	83	92	55.9	5.6	67.6
Sep 2001	2.60 K	0.00	340	14.7	63.4 L	52.4 L	58.1 K	97 K	80 K	90	54.9	4.5	66.6
Oct 2001	1.65	0.06 K	207 K	13.8	65.8 K	47.9 K	56.8	97	71	88	53.1	4.3	63.2
Nov 2001	1.51	1.67	198	13.0 K	63.2 K	46.2 K	54.3	98 K	73 K	90 K	51.2 K	4.6 K	58.2
Dec 2001	1.29 K	3.89	169 K	10.9 K	58.5	42.7	50.8	96 K	69 K	86	46.6	5.5 K	51.9 K
Jan 2002	1.62	1.36	231	9.4	57.0 K	37.0	46.4	97	64	85	42.2	4.2	49.0
Feb 2002	2.39 K	1.26	310	10.7	64.2 K	41.5	51.5	97	57	82	45.9	5.1	51.0
Mar 2002	3.64	1.52 K	439 K	10.3 K	59.7 K	41.1	50.6	95	63	82 K	45.0 K	6.3 K	54.8
Apr 2002	3.77	0.32 K	446 K	11.9	60.0	45.8 K	53.5	95	72	85	49.0	6.1 K	59.6 K
May 2002	4.87	0.40	570	12.1	60.6 K	45.8 K	54.0	96	72	85	49.5	7.6 K	62.0
Jun 2002	4.69 K	0.00	567	13.5	62.5 K	50.4	56.2	97	77	88	52.6	7.3	64.6

Monthly Report

Monterey Bay - Castroville - 19

Date	Tot ETo (in)	Tot Precip (in)	Avg Sol Rad (Ly/Day)	Avg Vap Pres (mBars)	Avg Max Air Tmp (F)	Avg Min Air Tmp (F)	Avg Air Tmp (F)	Avg Max Rel Hum (%)	Avg Min Rel Hum (%)	Avg Rel Hum (%)	Avg Dew Point (F)	Avg Wind Speed (mph)	Avg Soil Temp (F)
Jul 2002	4.16 K	0.00 K	482	14.8	63.7 K	53.5 K	58.1	98	80	90	55.1	5.8	67.0
Aug 2002	3.41 K	0.00	400	15.2	64.1 K	54.4 K	59.0 K	97 K	80 K	89	55.8	5.0 K	67.4
Sep 2002	3.43 K	0.00	419 K	14.9	65.6 K	51.4 K	58.3	98	76	89	55.1	4.7	66.8
Oct 2002	2.60	0.00	300	13.1	65.5 K	48.5	56.1	96	67	85	51.6	4.4	62.4
Nov 2002	2.01 K	1.80	238	12.0 K	68.2 K	45.8 K	55.6	95	57	79 K	48.9 K	4.8 K	57.1
Dec 2002	1.30	3.17 K	170	11.3	60.6	43.0 K	51.1	97	71	88	47.6	5.8 K	51.6
Jan 2003	1.86	2.06 K	229	12.5	65.4 K	45.7 K	54.8	98	67	86	50.4	4.9	54.0
Feb 2003	2.22	1.26	293	10.3 K	61.4	40.5	51.1	95	60	80 K	44.8 K	5.2	53.1
Mar 2003	3.75 K	0.98	456 K	11.7	62.8 K	42.0	52.9	98	66	85	48.5	5.5 K	55.0
Apr 2003	4.09 K	1.97 K	496	11.5	60.5	43.2	52.6	97	69	84	48.0	5.9	54.5
May 2003	4.87 K	0.29 K	561	12.8	62.5 K	46.8 K	55.4	96	73	85	51.1	5.8 K	60.3
Jun 2003	4.82 K	0.00	535	14.1	63.7 K	52.1 K	58.3 K	96 K	74 K	85	53.7	8.1 K	65.6
Jul 2003	4.50	0.00	508	15.0 K	63.9	53.6 K	58.1	99 K	80 K	90 K	55.3 K	6.3	68.2 L
Aug 2003	4.49 K	0.00	488	17.1 K	68.3 K	56.6 K	62.4	97	78	89 K	59.0 K	5.5	71.8 K
Sep 2003	3.32 K	0.00	394 L	16.5	69.1 K	54.2	61.5 K	98 K	75 K	89	58.1	4.0 K	69.4 K
Oct 2003	3.03 K	0.19	353 K	13.4	68.6 K	46.5 K	56.6 K	97 K	68 K	86	52.1	4.5 K	63.4
Nov 2003	1.86	1.26	248	11.2	62.3	41.8	51.5	97	63	85	47.0	4.4	54.4
Dec 2003	1.23	5.47 K	159	11.5 K	59.7	44.3 K	51.8	96	71	87 K	47.8 K	5.3 K	52.3
Jan 2004	1.30	1.44	178	10.6	58.3	41.2	49.3	98	71	88	45.9	4.4	50.4
Feb 2004	1.71	3.20	234	11.2	59.5	42.4	50.8	98	71	88	47.2	5.1 K	51.9
Mar 2004	3.51 K	0.38 K	424 L	13.0	65.0 K	45.3	54.8 K	99 K	71 K	89	51.5	4.8	57.0
Apr 2004	4.46 K	0.06	542	12.1	62.4 K	44.9	54.5 K	97 K	66 K	84	49.5	5.3	58.1
May 2004	5.64	0.11 K	639	13.4	64.4 K	47.1 K	56.7	97	72	85	52.3	6.4	64.2
Jun 2004	5.34	0.00	622	14.3	64.8	51.2	58.0	98	74	87	54.0	7.6 K	66.8
Jul 2004	3.57	0.00	405	16.3 K	65.9	56.0 K	60.4	98	80	91 K	57.7 K	6.6 K	67.9
Aug 2004	3.67 K	0.00	423	17.2 K	66.7 L	56.4 K	61.6 K	99 K	82 K	92 K	59.2 K	5.5	69.0
Sep 2004	3.48 K	0.02	409 K	15.3	68.0 L	51.5 K	59.9 K	99 K	69 K	87	55.8	5.2 K	68.0
Oct 2004	1.69	1.35	211	14.3	65.5 K	49.4	57.0	99	75	90	54.1	4.6 K	62.7
Nov 2004	1.95	0.24 K	243 L	11.2	63.1	42.7	52.7	96	60	81	46.6	4.6 K	55.9
Dec 2004	1.71	4.44	206	10.7 K	62.0 K	42.2 K	50.9	97	62	83 K	45.7 K	5.8 K	51.1
Jan 2005	1.51	3.32 K	199	11.4	60.5 K	43.4	51.3	98	72	88	47.8	5.3 K	51.5
Feb 2005	1.85	3.39	255	12.6	62.8	46.7	54.1	99	71	88	50.6	5.0 K	54.1
Mar 2005	3.06 K	3.92	364	13.6 K	63.8 K	47.9 K	55.6 K	99 K	73 K	90 K	52.5 K	5.6 K	57.7
Apr 2005	4.33	1.65	517	12.3	62.1	44.1	53.8	99	70	87	50.0	6.0	58.6
May 2005	5.07 K	0.63	553	14.8 K	65.5 K	50.5 K	58.9	98	73	87 K	55.0 K	7.3 K	65.1
Jun 2005	5.10	0.00	588 L	15.0 K	64.6	52.3 L	58.6	99	77	89 K	55.3 K	7.5 K	68.0
Jul 2005	3.51 K	0.00	422	18.1 K	66.0 K	57.3 L	61.3	100	90	97 K	59.2 K	5.2 K	68.1
Aug 2005	2.47	0.00	321	15.8 K	62.6	53.4 L	57.6 L	100 K	88 K	97 L	56.6 L	4.7	66.9

Monthly Report

Monterey Bay - Castroville - 19

Date	Tot ETo (in)	Tot Precip (in)	Avg Sol Rad (Ly/Day)	Avg Vap Pres (mBars)	Avg Max Air Tmp (F)	Avg Min Air Tmp (F)	Avg Air Tmp (F)	Avg Max Rel Hum (%)	Avg Min Rel Hum (%)	Avg Rel Hum (%)	Avg Dew Point (F)	Avg Wind Speed (mph)	Avg Soil Temp (F)
Sep 2005	3.11	0.00	387 K	14.5	63.2 K	50.4 K	56.4	100	79	93	54.4	4.7	66.4
Oct 2005	2.86 K	0.21	348 K	13.0	64.0	45.2 K	54.4	100	70	90	51.4	4.7 K	62.4
Nov 2005	2.10 K	0.78	252	11.3	66.4 K	43.6 K	53.8	97	55	81	47.2	4.6	57.8
Dec 2005	1.27	3.88	169	11.7 K	60.4 K	42.8 K	51.2	99	68	89 K	48.0 K	5.1 K	53.5
Jan 2006	1.64	2.21 K	229	10.7	58.9	40.6	49.4	99	68	89	46.1	5.2 K	52.8
Feb 2006	2.36 K	0.45 K	322 K	10.2	62.1 K	40.9	50.1 K	98 K	56 K	82	44.5	5.9 K	53.5
Mar 2006	2.93 K	1.29 K	381 K	10.3 K	56.4 K	40.0	48.3	99	70	88 K	45.0 K	6.3 K	53.5
Apr 2006	2.98	0.13 K	374 K	12.4	59.5	46.2 K	53.1	99	75	90	50.2	5.8 K	57.4
May 2006	4.64	0.66	527	12.8	62.4	47.9	55.3	96	74	86	51.1	6.5 K	62.7
Jun 2006	4.34 K	0.00 K	501 L	13.9	64.1	50.8 K	57.5	96	75	86	53.3	6.8 K	66.9
Jul 2006	4.76	0.02	543	14.9	64.4 K	53.1 K	58.2	97	79	90	55.2	5.6	70.5 K
Aug 2006	3.23 K	0.07	375	14.8	63.7 K	54.1	58.5	95	79	88	55.0	5.2	69.6
Sep 2006	2.75 K	0.00	338	13.8	64.0 K	50.5	56.7	96	76	88	53.2	4.8 K	67.1
Oct 2006	3.08	0.15 K	352 L	12.1 K	67.6 K	45.1 K	56.1	93	58	79 K	49.3 K	4.5	63.4
Nov 2006	1.69	1.98	225	11.8 K	62.5	42.6 K	52.5	96	67	86 K	48.3 K	4.1	58.3
Dec 2006	1.58	2.47	186	9.1	60.2 K	39.0 K	48.3	92	56	77	41.2	4.7 K	50.9
Jan 2007	2.02	0.94	253	7.8 K	57.0 K	34.6 K	44.8	92	50	75 K	36.9 K	5.0	47.5
Feb 2007	1.85	3.01	261	10.5	58.9 K	41.3	50.0	96	67	85	45.6	5.4	53.2
Mar 2007	3.32 K	0.34	407	11.0	61.9 K	43.1	51.4 K	95 K	65 K	85	46.9	5.0 K	56.6
Apr 2007	4.01	1.17	501	11.0	58.8	42.8	51.1	95	73	86	47.1	6.1 K	60.9 K
May 2007	4.45 K	0.35	519	11.6	60.8 K	45.9 K	53.3 K	94 K	71 K	84	48.5	6.4	64.5
Jun 2007	4.76	0.04	538	12.6	62.3	48.8	55.6	94	72	84	50.7	7.8 K	66.9
Jul 2007	3.88	1.93	426	14.6	64.3	52.5 K	58.3	95	77	87	54.6	6.4 K	69.7
Aug 2007	4.26	0.03	481	14.7	64.7	52.3 K	58.6	95	77	88	54.9	5.6	69.2
Sep 2007	3.34	0.00	381	14.3	66.8 K	50.6 K	58.7 K	94 K	69 K	84	54.0	5.3 K	66.6
Oct 2007	2.08	0.65	235	12.2	65.4 K	44.5 K	54.8	94	66	84	49.7	4.8 K	60.2
Nov 2007	1.46 K	0.17 K	178	10.8	63.2 K	43.1	51.7	94	61	81	45.9	4.3	57.1
Dec 2007	1.32	1.55	151	8.5	56.7	36.6	46.2	92	58	79	39.9	5.1 K	50.5
Jan 2008	1.23	3.07 K	143	9.1	56.5 K	39.2	47.4	93	64	81	41.7	6.4 K	50.1
Feb 2008	1.84	1.96	237	9.5 K	57.6	39.3	48.2	94	64	83 K	42.9 K	5.4 K	51.5
Mar 2008	3.21	0.41	393	9.8 K	58.5	38.8 K	48.7	94	65	83 K	43.8 K	5.3 K	54.8
Apr 2008	4.77	0.26 K	600 L	9.5 K	59.0 K	38.4 K	49.2	92	65	80 K	43.2 K	6.4 K	57.1
May 2008	4.67 K	0.02	593 K	10.7 K	58.6 K	42.0 K	50.9 K	93 K	72 K	84 K	46.2 K	6.1	62.1
Jun 2008	4.79 K	0.00	594	11.3 K	61.5 K	45.7 K	54.3 K	92 K	66 K	79 K	47.7 K	7.4 K	65.3
Jul 2008	4.41	0.00	521	13.6	61.9 K	51.6	56.2	95	80	88	52.8	6.0	67.6
Aug 2008	3.58 K	0.00	454	97.6 K	62.8 K	51.0 L	55.5 L	96 K	81 K	90 L	53.0 L	4.8 K	67.4
Sep 2008	3.53 K	0.00	430 K	13.7	66.5 K	49.4 K	57.4 K	94 K	71 K	85	52.9	4.0	64.9
Oct 2008	3.22 K	0.00	358 K	11.9 K	69.1 K	45.9 K	55.7 K	93 K	57 K	78 K	48.7 K	4.5 K	61.6

Monthly Report

Monterey Bay - Castroville - 19

Date	Tot ETo (in)	Tot Precip (in)	Avg Sol Rad (Ly/Day)	Avg Vap Pres (mBars)	Avg Max Air Tmp (F)	Avg Min Air Tmp (F)	Avg Air Tmp (F)	Avg Max Rel Hum (%)	Avg Min Rel Hum (%)	Avg Rel Hum (%)	Avg Dew Point (F)	Avg Wind Speed (mph)	Avg Soil Temp (F)
Nov 2008	2.05 K	0.00	258 K	11.7	65.8 K	45.3 K	54.6 K	94 K	62 K	81	48.6	4.2 K	57.9
Dec 2008	1.72 K	0.02	224	8.8	58.0 K	37.4	47.1	93	58	80	41.1	4.9 K	51.6
Jan 2009	2.24 K	1.69	265 K	8.4	64.0 K	38.9	49.9	89	47	70	39.6	5.0	50.5
Feb 2009	2.10	5.24	294 K	9.9	60.0 K	41.6	49.7	93	63	81	44.0	5.7 K	52.4
Mar 2009	3.52	1.96 K	441 L	10.1 K	59.3	40.5 K	49.7	95	64	82 K	44.4 K	4.9 K	55.8
Apr 2009	4.34 K	0.45 K	531	11.1 K	62.7 K	41.3 K	51.4 K	96 K	62 K	83 K	46.7 K	5.2	59.9 K
May 2009	3.81 K	0.41 K	475 K	18.8 K	67.9 K	29.8 K	48.4 K	97 K	81 K	88 K	44.3 K	6.2	63.8
Jun 2009	4.83	0.00	528	13.5	64.7	52.1	58.0	93	69	82	52.4	7.8 K	68.4
Jul 2009	4.29	0.00	492	13.9	62.0	52.1 K	56.7	96	79	89	53.3	5.9	69.3
Aug 2009	3.59 K	0.00	417	14.8	65.2 K	53.8	58.4 K	96 K	77 K	89	55.0	5.3	70.7
Sep 2009	3.45	0.00	416	14.5	65.4 K	50.9 K	57.6	97	78	90	54.5	4.5 K	69.7 K
Oct 2009	2.91	2.68	325	12.6 K	65.3	46.6 K	55.7	93	65	82 K	50.1 K	5.2 K	62.7
Nov 2009	2.03 K	0.06 K	237 K	9.6 K	64.7 K	39.0	50.7 K	92 K	50 K	76	43.1	4.6 K	56.7 K
Dec 2009	1.31 K	2.22 K	161 K	9.4 K	57.9 K	39.4	47.8 K	92 K	61 K	81	42.3	5.2 K	51.6 K
Totals	375.43	123.31	376	13.2	62.7	46.0	54.1	96	70	86	49.7	5.5	60.2

Flag Legend

M - All Daily Values Missing	K - One or More Daily Values Flagged
J - One or More Daily Values Missing	L - Missing and Flagged Daily Values

Conversion Table

W/sq.m = Ly/day / 2.065	inches * 25.4 = mm
C = 5/9 * (F - 32)	m/s = mph * 0.447
kPa = mBars * 0.1	

D.2: Rainwater Quality Data

MBAS
MONTEREY BAY ANALYTICAL SERVICES
PRECISION ● ACCURACY ● DEPENDABILITY
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831.375.MBAS
montereybayanalytical@usa.net
ELAP Certification Number: 2385

Monday, November 30, 2009

MRWPCA
Laboratory
5 Harris Court, Building D
Monterey, CA 93940

Lab Number: **AA61401**

Collection Date/Time:	10/13/2009	15:00	Sample Collector:	ARREGUIN, J
Submittal Date/Time:	10/15/2009	17:46	Sample ID	

Sample Description: Rainwater (RTP)

Analyte	Method	Unit	**Result**	Qual	PQL	Date Analyzed
Alkalinity, Total (as CaCO3)	2320B	mg/L	**2.2**		2	10/20/2009
Bicarbonate (as HCO3-)	2320B	mg/L	**3**		10	10/20/2009
Boron, Total	EPA200.8	mg/L	**Not detected**		0.01	11/4/2009
Calcium	3111B	mg/L	**Not detected**		1	10/30/2009
Chloride	300.0	mg/L	**3**		1	10/20/2009
Magnesium	3111B	mg/L	**Not detected**		1	10/30/2009
Nitrate as NO3	300.0	mg/L	**1**		1	10/20/2009
Nitrite as NO2-N	300.0	mg/L	**Not detected**		0.1	10/20/2009
o-Phosphate-P	300.0	mg/L	**Not detected**		0.05	10/20/2009
pH (Laboratory)	4500-H+B	STD. Units	**6.6**			10/20/2009
Potassium	3111B	mg/L	**Not detected**		0.5	10/30/2009
QC Ratio TDS/SEC	Calculation		**Completed**			11/19/2009
Sodium	3111B	mg/L	**Not detected**		1	10/30/2009
Specific Conductance (E.C)	2510B	umhos/cm	**5**		1	10/20/2009
Sulfate	300.0	mg/L	**1**		1	10/20/2009
Total Diss. Solids	2540C	mg/L	**Not detected**		10	10/13/2009

Sample Comments:

Report Approved by:

David Holland, Laboratory Director

mg/L: Milligrams per liter (=ppm) ug/L : Micrograms per liter (=ppb) PQL : Practical Quantitation Limit
H = Analyzed ouside of hold time E = Analysis performed by External Laboratory; See External Laboratory Report attachments.
J = Result is less than PQL

MONTEREY BAY ANALYTICAL SERVICES
PRECISION ● ACCURACY ● DEPENDABILITY
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montereybayanalytical@usa.net
ELAP Certification Number: 2385

Monday, November 30, 2009

MRWPCA
Laboratory
5 Harris Court, Building D
Monterey, CA 93940

Lab Number: **AA61402**

Collection Date/Time: 10/13/2009 15:00 Sample Collector: ARREGUIN, J
Submittal Date/Time: 10/15/2009 17:46 Sample ID

Sample Description: Rainwater (Field)

Analyte	Method	Unit	**Result**	Qual	PQL	Date Analyzed
Alkalinity, Total (as CaCO3)	2320B	mg/L	**4.8**		2	10/20/2009
Bicarbonate (as HCO3-)	2320B	mg/L	**6**		10	10/20/2009
Boron, Total	EPA200.8	mg/L	**Not detected**		0.01	11/4/2009
Calcium	3111B	mg/L	**Not detected**		1	10/30/2009
Chloride	300.0	mg/L	**4**		1	10/20/2009
Magnesium	3111B	mg/L	**Not detected**		1	10/30/2009
Nitrate as NO3	300.0	mg/L	**Not detected**		1	10/20/2009
Nitrite as NO2-N	300.0	mg/L	**Not detected**		0.1	10/20/2009
o-Phosphate-P	300.0	mg/L	**Not detected**		0.05	10/20/2009
pH (Laboratory)	4500-H+B	STD. Units	**6.6**			10/20/2009
Potassium	3111B	mg/L	**0.8**		0.5	10/30/2009
QC Ratio TDS/SEC	Calculation		**0.67**			11/3/2009
Sodium	3111B	mg/L	**Not detected**		1	10/30/2009
Specific Conductance (E.C)	2510B	umhos/cm	**18**		1	10/20/2009
Sulfate	300.0	mg/L	**1**		1	10/20/2009
Total Diss. Solids	2540C	mg/L	**12**		10	10/13/2009

Sample Comments:

Report Approved by:

David Holland, Laboratory Director

mg/L: Milligrams per liter (=ppm) ug/L : Micrograms per liter (=ppb) PQL : Practical Quantitation Limit
H = Analyzed ouside of hold time E = Analysis performed by External Laboratory; See External Laboratory Report attachments.
J = Result is less than PQL

Appendix E: Statistical Analysis

E.1: Statistical Analyses of the Soil Salinity Data

Descriptive Statistics: All Measures

The MEANS Procedure

Variable	Label	N	Mean	Std Dev	Minimum	Maximum
Na	Na	525	7.6205714	4.1269728	1.2000000	31.2000000
Ca	Ca	525	10.6099048	6.9568666	0.3000000	46.1000000
Cl	Cl	525	8.6043810	7.6943992	0	38.9000000
Ece	Ece	525	2.5883238	1.4458375	0.2900000	10.2500000
ESP	ESP	525	2.5352762	1.4275255	0	9.5400000
Mg	Mg	525	8.0496381	5.4887056	0.5000000	47.1000000
SAR	SAR	525	2.6328000	1.0319210	1.0400000	8.0100000

Na by Year

The MEANS Procedure

Analysis Variable : Na						
year	**N Obs**	**N**	**Mean**	**Std Dev**	**Minimum**	**Maximum**
2000	54	54	5.6111111	3.2777504	1.6000000	13.6000000
2001	54	54	5.9055556	3.2052090	1.2000000	13.4000000
2002	54	54	6.8814815	3.2021263	2.6000000	14.6000000
2003	54	54	8.9611111	5.3043384	2.2000000	30.4000000
2004	54	54	7.4481481	3.5435160	2.4000000	15.7000000
2005	48	48	7.0270833	3.4450544	2.6000000	15.5000000
2006	48	48	7.9229167	3.5945727	2.8000000	16.4000000
2007	54	54	8.2740741	3.9472553	3.8000000	20.4000000
2008	54	54	9.5981481	5.0211060	3.3000000	31.2000000
2009	51	51	8.5980392	4.4142719	2.2000000	23.0000000

Na by Farm

The MEANS Procedure

Analysis Variable : Na						
farm	**N Obs**	**N**	**Mean**	**Std Dev**	**Minimum**	**Maximum**
1	177	177	8.7237288	5.3561033	1.6000000	31.2000000
3	174	174	7.4821839	3.7577625	1.2000000	24.4000000
4	174	174	6.6367816	2.4584696	2.3000000	17.0000000

Na by Treatment

The MEANS Procedure

Analysis Variable : Na						
treat	**N Obs**	**N**	**Mean**	**Std Dev**	**Minimum**	**Maximum**
Control	267	267	5.5820225	2.2952990	1.2000000	17.0000000
Test	258	258	9.7302326	4.5263965	2.3000000	31.2000000

Na by Season

The MEANS Procedure

Analysis Variable : Na						
season	**N Obs**	**N**	**Mean**	**Std Dev**	**Minimum**	**Maximum**
Fall	171	171	7.6093567	4.0550513	2.2000000	31.2000000
Spring	180	180	7.5550000	4.3754811	2.2000000	30.4000000
Summer	174	174	7.6994253	3.9509492	1.2000000	23.0000000

Na by Depth

The MEANS Procedure

Analysis Variable : Na						
depth	N Obs	N	Mean	Std Dev	Minimum	Maximum
1	175	175	7.2885714	3.6778751	1.6000000	18.8000000
2	175	175	7.9045714	4.6387277	1.2000000	31.2000000
3	175	175	7.6685714	4.0065730	2.2000000	24.4000000

Na by Year and Treatment

The MEANS Procedure

Analysis Variable : Na							
year	treat	N Obs	N	Mean	Std Dev	Minimum	Maximum
2000	Control	27	27	4.2851852	2.2875421	1.6000000	10.2000000
	Test	27	27	6.9370370	3.6078065	2.3000000	13.6000000
2001	Control	27	27	3.8888889	1.5682752	1.2000000	8.0000000
	Test	27	27	7.9222222	3.1679080	2.3000000	13.4000000
2002	Control	27	27	5.1222222	1.2920864	2.6000000	8.0000000
	Test	27	27	8.6407407	3.5782741	3.0000000	14.6000000
2003	Control	27	27	5.9703704	2.1279847	2.2000000	9.9000000
	Test	27	27	11.9518519	5.8522429	4.8000000	30.4000000
2004	Control	27	27	5.3111111	1.6383231	2.4000000	9.3000000
	Test	27	27	9.5851852	3.6642455	4.3000000	15.7000000
2005	Control	27	27	5.4814815	2.1253121	2.6000000	11.7000000
	Test	21	21	9.0142857	3.8271773	3.8000000	15.5000000
2006	Control	27	27	5.8407407	1.8374856	2.8000000	10.0000000
	Test	21	21	10.6000000	3.5492253	4.4000000	16.4000000
2007	Control	27	27	6.2518519	2.1442894	3.8000000	13.4000000
	Test	27	27	10.2962963	4.3208334	3.8000000	20.4000000
2008	Control	27	27	7.3666667	3.2099605	3.5000000	17.0000000
	Test	27	27	11.8296296	5.5449780	3.3000000	31.2000000
2009	Control	24	24	6.3916667	2.3525965	2.2000000	12.4000000
	Test	27	27	10.5592593	4.9080201	3.2000000	23.0000000

Ca by Year

The MEANS Procedure

Analysis Variable : Ca						
year	**N Obs**	**N**	**Mean**	**Std Dev**	**Minimum**	**Maximum**
2000	54	54	5.8314815	4.4636403	0.3000000	21.9000000
2001	54	54	8.8296296	6.4599676	0.9000000	25.1000000
2002	54	54	11.4444444	7.1570434	1.4000000	29.5000000
2003	54	54	13.1777778	7.8684387	1.9000000	46.1000000
2004	54	54	10.0166667	6.1098976	1.6000000	31.8000000
2005	48	48	9.2145833	5.0714465	1.7000000	21.2000000
2006	48	48	10.8208333	5.6711273	2.1000000	24.2000000
2007	54	54	12.7203704	6.5947486	2.1000000	30.2000000
2008	54	54	13.5000000	7.7684898	1.8000000	31.1000000
2009	51	51	10.4000000	8.1091553	1.2000000	37.6000000

Ca by Farm

The MEANS Procedure

Analysis Variable : Ca						
farm	**N Obs**	**N**	**Mean**	**Std Dev**	**Minimum**	**Maximum**
1	177	177	14.5768362	6.9638494	2.4000000	46.1000000
3	174	174	7.7988506	5.9910722	0.3000000	29.5000000
4	174	174	9.3856322	5.9839835	1.2000000	30.2000000

Ca by Treatment

The MEANS Procedure

Analysis Variable : Ca						
treat	N Obs	N	Mean	Std Dev	Minimum	Maximum
Control	267	267	10.4205993	7.1384053	0.5000000	37.6000000
Test	258	258	10.8058140	6.7721567	0.3000000	46.1000000

Ca by Season

The MEANS Procedure

Analysis Variable : Ca						
season	**N Obs**	**N**	**Mean**	**Std Dev**	**Minimum**	**Maximum**
Fall	171	171	11.4725146	7.4971292	0.3000000	37.6000000
Spring	180	180	10.2055556	6.9745325	0.9000000	46.1000000
Summer	174	174	10.1804598	6.3196700	1.0000000	30.2000000

Ca by Depth

The MEANS Procedure

Analysis Variable : Ca						
depth	N Obs	N	Mean	Std Dev	Minimum	Maximum
1	175	175	12.1440000	8.0656114	1.2000000	37.6000000
2	175	175	11.0148571	6.9811822	1.0000000	46.1000000
3	175	175	8.6708571	5.0641752	0.3000000	26.3000000

Ca by Year and Treatment

The MEANS Procedure

Analysis Variable : Ca							
year	treat	N Obs	N	Mean	Std Dev	Minimum	Maximum
2000	Control	27	27	5.1074074	4.6334010	0.5000000	21.9000000
	Test	27	27	6.5555556	4.2493740	0.3000000	19.2000000
2001	Control	27	27	7.2148148	5.6586696	0.9000000	25.1000000
	Test	27	27	10.4444444	6.9015234	1.9000000	25.1000000
2002	Control	27	27	10.7037037	6.5888882	1.4000000	27.6000000
	Test	27	27	12.1851852	7.7371583	2.7000000	29.5000000
2003	Control	27	27	11.1592593	4.7114639	1.9000000	18.8000000
	Test	27	27	15.1962963	9.7747509	4.1000000	46.1000000
2004	Control	27	27	9.2370370	6.7374469	1.6000000	31.8000000
	Test	27	27	10.7962963	5.4260399	3.2000000	22.0000000
2005	Control	27	27	8.7370370	4.8897969	1.7000000	21.2000000
	Test	21	21	9.8285714	5.3529565	2.0000000	18.7000000
2006	Control	27	27	11.4185185	6.3830326	2.1000000	24.2000000
	Test	21	21	10.0523810	4.6380620	3.3000000	19.9000000
2007	Control	27	27	13.7370370	7.3331779	2.1000000	30.2000000
	Test	27	27	11.7037037	5.7211807	3.0000000	25.4000000
2008	Control	27	27	15.1592593	8.4583259	2.9000000	30.3000000
	Test	27	27	11.8407407	6.7645148	1.8000000	31.1000000
2009	Control	24	24	11.8958333	9.7470388	1.8000000	37.6000000
	Test	27	27	9.0703704	6.2060030	1.2000000	27.4000000

Cl by Year

The MEANS Procedure

Analysis Variable : Cl						
year	N Obs	N	Mean	Std Dev	Minimum	Maximum
2000	54	54	2.2611111	1.1878976	0.7000000	6.8000000
2001	54	54	2.3629630	1.1934248	0.5000000	5.7000000
2002	54	54	4.2648148	2.3226658	1.5000000	13.5000000
2003	54	54	9.3148148	7.2470009	0	32.5000000
2004	54	54	9.8740741	6.5862402	1.0000000	27.2000000
2005	48	48	10.2208333	7.2056408	0.2000000	30.9000000
2006	48	48	10.6791667	6.9247308	0.5000000	31.5000000
2007	54	54	12.4851852	7.9322463	1.1000000	31.7000000
2008	54	54	13.9296296	10.0633396	0.9000000	38.9000000
2009	51	51	11.2058824	8.5771653	1.5000000	37.3000000

Cl by Farm

The MEANS Procedure

Analysis Variable : Cl						
farm	**N Obs**	**N**	**Mean**	**Std Dev**	**Minimum**	**Maximum**
1	177	177	10.9305085	8.3667548	0.7000000	38.9000000
3	174	174	5.5879310	4.7323415	0	25.8000000
4	174	174	9.2545977	8.4022676	0.8000000	35.7000000

Cl by Treatment

The MEANS Procedure

Analysis Variable : Cl						
treat	**N Obs**	**N**	**Mean**	**Std Dev**	**Minimum**	**Maximum**
Control	267	267	9.0737828	9.3651442	0	38.9000000
Test	258	258	8.1186047	5.4284489	0.8000000	31.1000000

Cl by Season

The MEANS Procedure

Analysis Variable : Cl						
season	N Obs	N	Mean	Std Dev	Minimum	Maximum
Fall	171	171	9.6923977	7.8666160	0	37.3000000
Spring	180	180	7.2488889	6.7149753	0.5000000	38.9000000
Summer	174	174	8.9373563	8.2863657	0.2000000	35.7000000

Cl by Depth

The MEANS Procedure

Analysis Variable : Cl						
depth	N Obs	N	Mean	Std Dev	Minimum	Maximum
1	175	175	7.2708571	6.9549459	0.2000000	35.7000000
2	175	175	9.2131429	8.2785277	0	38.9000000
3	175	175	9.3291429	7.6613980	0.6000000	37.3000000

Cl by Year and Treatment

The MEANS Procedure

Analysis Variable : Cl							
year	treat	N Obs	N	Mean	Std Dev	Minimum	Maximum
2000	Control	27	27	1.9111111	0.9576949	0.7000000	4.4000000
	Test	27	27	2.6111111	1.3057074	1.0000000	6.8000000
2001	Control	27	27	1.7777778	0.7271299	0.5000000	3.6000000
	Test	27	27	2.9481481	1.2897139	0.8000000	5.7000000
2002	Control	27	27	3.4111111	1.3139293	1.5000000	6.1000000
	Test	27	27	5.1185185	2.7851304	1.8000000	13.5000000
2003	Control	27	27	9.0851852	9.4638463	0	32.5000000
	Test	27	27	9.5444444	4.1694247	2.9000000	18.4000000
2004	Control	27	27	10.3814815	8.1034673	1.0000000	27.2000000
	Test	27	27	9.3666667	4.7142990	3.3000000	18.3000000
2005	Control	27	27	10.5962963	8.8274694	0.2000000	30.9000000
	Test	21	21	9.7380952	4.5031629	3.4000000	18.4000000
2006	Control	27	27	11.3814815	8.4921247	0.5000000	31.5000000
	Test	21	21	9.7761905	4.1729971	3.3000000	17.9000000
2007	Control	27	27	13.7000000	9.7665441	1.1000000	31.7000000
	Test	27	27	11.2703704	5.4599109	3.3000000	22.1000000
2008	Control	27	27	16.7407407	12.0869052	0.9000000	38.9000000
	Test	27	27	11.1185185	6.6280312	2.3000000	31.1000000
2009	Control	24	24	12.0875000	10.8508991	1.5000000	37.3000000
	Test	27	27	10.4222222	5.9970719	2.8000000	25.8000000

ECe by Year

The MEANS Procedure

Analysis Variable : ECe						
year	N Obs	N	Mean	Std Dev	Minimum	Maximum
2000	54	54	1.6814815	1.0498704	0.4500000	4.6800000
2001	54	54	2.2075926	1.3547902	0.2900000	5.6600000
2002	54	54	2.8162963	1.4711929	0.6000000	6.2800000
2003	54	54	3.5566667	1.8548681	0.8600000	10.2500000
2004	54	54	2.3331481	1.1836270	0.5300000	5.6200000
2005	48	48	2.2664583	1.0607073	0.7200000	4.8100000
2006	48	48	2.3845833	0.9879529	0.6600000	4.5500000
2007	54	54	2.8233333	1.2802579	0.9000000	6.6600000
2008	54	54	3.2359259	1.5975057	0.6400000	8.9800000
2009	51	51	2.5152941	1.4521823	0.5300000	6.2500000

ECe by Farm

The MEANS Procedure

Analysis Variable : ECe						
farm	**N Obs**	**N**	**Mean**	**Std Dev**	**Minimum**	**Maximum**
1	177	177	3.3843503	1.5303712	0.6000000	10.2500000
3	174	174	2.1204598	1.2483574	0.2900000	6.2800000
4	174	174	2.2464368	1.1851904	0.5300000	7.2000000

ECe by Treatment

The MEANS Procedure

Analysis Variable : ECe						
treat	N Obs	N	Mean	Std Dev	Minimum	Maximum
Control	267	267	2.2895880	1.2319940	0.2900000	6.2500000
Test	258	258	2.8974806	1.5819624	0.5300000	10.2500000

ECe by Season

The MEANS Procedure

Analysis Variable : ECe						
season	**N Obs**	**N**	**Mean**	**Std Dev**	**Minimum**	**Maximum**
Fall	171	171	2.6920468	1.4700344	0.5100000	8.9800000
Spring	180	180	2.5642778	1.5689441	0.5300000	10.2500000
Summer	174	174	2.5112644	1.2822098	0.2900000	6.0700000

ECe by Depth

The MEANS Procedure

Analysis Variable : ECe						
depth	N Obs	N	Mean	Std Dev	Minimum	Maximum
1	175	175	2.6673143	1.5706932	0.4700000	6.5700000
2	175	175	2.6903429	1.5520024	0.2900000	10.2500000
3	175	175	2.4073143	1.1704195	0.5200000	6.2000000

ECe by Year and Treatment

The MEANS Procedure

Analysis Variable : ECe							
year	treat	N Obs	N	Mean	Std Dev	Minimum	Maximum
2000	Control	27	27	1.3633333	0.8555880	0.4500000	3.9300000
	Test	27	27	1.9996296	1.1421891	0.6600000	4.6800000
2001	Control	27	27	1.6577778	1.0431805	0.2900000	4.6000000
	Test	27	27	2.7574074	1.4231779	0.5900000	5.6600000
2002	Control	27	27	2.4462963	1.2063267	0.6000000	5.1200000
	Test	27	27	3.1862963	1.6347810	0.8300000	6.2800000
2003	Control	27	27	2.6618519	0.9604287	0.8600000	4.2100000
	Test	27	27	4.4514815	2.1042808	1.2000000	10.2500000
2004	Control	27	27	2.0762963	1.1913507	0.5300000	5.6200000
	Test	27	27	2.5900000	1.1399528	0.9500000	4.7500000
2005	Control	27	27	2.0081481	0.7975590	0.8900000	3.8600000
	Test	21	21	2.5985714	1.2693159	0.7200000	4.8100000
2006	Control	27	27	2.2448148	0.9617347	0.6600000	3.9300000
	Test	21	21	2.5642857	1.0153944	1.3100000	4.5500000
2007	Control	27	27	2.7018519	1.1216953	0.9300000	5.7900000
	Test	27	27	2.9448148	1.4325888	0.9000000	6.6600000
2008	Control	27	27	3.2040741	1.4226986	1.1900000	5.7600000
	Test	27	27	3.2677778	1.7821407	0.6400000	8.9800000
2009	Control	24	24	2.5616667	1.6292160	0.6000000	6.2500000
	Test	27	27	2.4740741	1.3052299	0.5300000	5.5700000

ESP by Year

The MEANS Procedure

Analysis Variable : ESP						
year	**N Obs**	**N**	**Mean**	**Std Dev**	**Minimum**	**Maximum**
2000	54	54	2.4450000	1.7191680	0.2800000	9.5400000
2001	54	54	1.9629630	1.2219095	0.3100000	5.5300000
2002	54	54	2.0777778	1.1403751	0.4400000	4.8500000
2003	54	54	2.4940741	1.4640413	0	7.2900000
2004	54	54	2.4798148	1.1071304	0.5200000	4.7200000
2005	48	48	2.4218750	1.2601277	0.4700000	5.8100000
2006	48	48	3.0222917	1.7970179	0.7100000	8.7700000
2007	54	54	2.4629630	1.2587080	0.7000000	5.4900000
2008	54	54	2.9064815	1.3804773	0.6700000	6.5600000
2009	51	51	3.1554902	1.4432246	0.9800000	7.0700000

ESP by Farm

The MEANS Procedure

Analysis Variable : ESP						
farm	N Obs	N	Mean	Std Dev	Minimum	Maximum
1	177	177	2.1575141	1.5574566	0	6.5600000
3	174	174	3.0172414	1.3918227	0.5400000	9.5400000
4	174	174	2.4375862	1.1739863	0.7800000	8.7700000

ESP by Treatment

The MEANS Procedure

Analysis Variable : ESP						
treat	N Obs	N	Mean	Std Dev	Minimum	Maximum
Control	267	267	1.7255805	0.9454978	0	5.2800000
Test	258	258	3.3732171	1.3578236	0.6500000	9.5400000

ESP by Season

The MEANS Procedure

Analysis Variable : ESP						
season	N Obs	N	Mean	Std Dev	Minimum	Maximum
Fall	171	171	2.4302924	1.3740004	0.3100000	9.5400000
Spring	180	180	2.5475556	1.4734343	0.2900000	8.7700000
Summer	174	174	2.6257471	1.4323610	0	7.0700000

ESP by Depth

The MEANS Procedure

Analysis Variable : ESP						
depth	**N Obs**	**N**	**Mean**	**Std Dev**	**Minimum**	**Maximum**
1	175	175	2.3513714	1.2962791	0	8.2600000
2	175	175	2.5147429	1.3208295	0.1800000	8.7700000
3	175	175	2.7397143	1.6234242	0.1100000	9.5400000

ESP by Year and Treatment

The MEANS Procedure

Analysis Variable : ESP							
year	**treat**	**N Obs**	**N**	**Mean**	**Std Dev**	**Minimum**	**Maximum**
2000	Control	27	27	1.9100000	1.3692615	0.2800000	5.2800000
	Test	27	27	2.9800000	1.8855789	0.6500000	9.5400000
2001	Control	27	27	1.3029630	0.8620049	0.3100000	3.4800000
	Test	27	27	2.6229630	1.1814359	0.8800000	5.5300000
2002	Control	27	27	1.5496296	1.0362858	0.4400000	4.8500000
	Test	27	27	2.6059259	0.9988503	0.8600000	4.4700000
2003	Control	27	27	1.6088889	1.0445659	0	4.0500000
	Test	27	27	3.3792593	1.2848254	1.4900000	7.2900000
2004	Control	27	27	1.7685185	0.8606871	0.5200000	3.5900000
	Test	27	27	3.1911111	0.8408527	1.4500000	4.7200000
2005	Control	27	27	1.8137037	0.9539317	0.4700000	3.4100000
	Test	21	21	3.2038095	1.1863030	1.2700000	5.8100000
2006	Control	27	27	1.9196296	0.8786856	0.7100000	3.5600000
	Test	21	21	4.4400000	1.6832320	1.7800000	8.7700000
2007	Control	27	27	1.5800000	0.6443661	0.7000000	2.8400000
	Test	27	27	3.3459259	1.0932529	1.8200000	5.4900000
2008	Control	27	27	1.8733333	0.8748934	0.6700000	4.1600000
	Test	27	27	3.9396296	0.9499453	2.3000000	6.5600000
2009	Control	24	24	1.9545833	0.6292506	0.9800000	2.8700000
	Test	27	27	4.2229630	1.0680529	2.5600000	7.0700000

Mg by Year

The MEANS Procedure

Analysis Variable : Mg						
year	N Obs	N	Mean	Std Dev	Minimum	Maximum
2000	54	54	5.0462963	3.6905649	0.7000000	15.1000000
2001	54	54	6.9074074	4.6398541	0.5000000	18.0000000
2002	54	54	9.4537037	5.8374430	1.1000000	21.1000000
2003	54	54	11.4492593	7.6758880	2.4000000	47.1000000
2004	54	54	8.2351852	5.1182676	1.0000000	19.0000000
2005	48	48	7.0437500	4.1984752	0.8000000	20.6000000
2006	48	48	5.2375000	2.8909709	1.0000000	13.7000000
2007	54	54	9.2333333	4.8730294	1.6000000	25.0000000
2008	54	54	9.8296296	5.5073066	1.0000000	30.6000000
2009	51	51	7.6117647	5.5568569	0.7000000	24.3000000

Mg by Farm

The MEANS Procedure

Analysis Variable : Mg						
farm	N Obs	N	Mean	Std Dev	Minimum	Maximum
1	177	177	11.7870056	6.2597651	1.3000000	47.1000000
3	174	174	6.2445977	4.1536247	0.5000000	20.3000000
4	174	174	6.0528736	3.5431066	0.7000000	17.8000000

Mg by Treatment

The MEANS Procedure

Analysis Variable : Mg						
treat	N Obs	N	Mean	Std Dev	Minimum	Maximum
Control	267	267	7.2569288	4.3331797	0.5000000	19.8000000
Test	258	258	8.8700000	6.3766413	0.7000000	47.1000000

Mg by Season

The MEANS Procedure

Analysis Variable : Mg						
season	N Obs	N	Mean	Std Dev	Minimum	Maximum
Fall	171	171	8.3822222	5.3228407	0.7000000	30.6000000
Spring	180	180	8.0272222	6.1395033	0.7000000	47.1000000
Summer	174	174	7.7459770	4.9197210	0.5000000	24.3000000

Mg by Depth

The MEANS Procedure

Analysis Variable : Mg						
depth	N Obs	N	Mean	Std Dev	Minimum	Maximum
1	175	175	7.5649143	5.5882328	0.7000000	27.8000000
2	175	175	8.3862857	6.0072787	0.5000000	47.1000000
3	175	175	8.1977143	4.7995684	1.0000000	26.2000000

Mg by Year and Treatment

The MEANS Procedure

Analysis Variable : Mg							
year	treat	N Obs	N	Mean	Std Dev	Minimum	Maximum
2000	Control	27	27	4.0407407	2.6004821	0.7000000	10.2000000
	Test	27	27	6.0518519	4.3476227	0.8000000	15.1000000
2001	Control	27	27	5.2074074	3.7664435	0.5000000	15.2000000
	Test	27	27	8.6074074	4.8678637	0.9000000	18.0000000
2002	Control	27	27	8.3259259	4.9698005	1.1000000	17.5000000
	Test	27	27	10.5814815	6.4901130	1.3000000	21.1000000
2003	Control	27	27	9.2851852	4.0884174	2.6000000	17.8000000
	Test	27	27	13.6133333	9.6779543	2.4000000	47.1000000
2004	Control	27	27	7.2629630	4.6588335	1.0000000	19.0000000
	Test	27	27	9.2074074	5.4527993	1.7000000	18.6000000
2005	Control	27	27	6.1370370	2.5970617	1.8000000	13.0000000
	Test	21	21	8.2095238	5.4880693	0.8000000	20.6000000
2006	Control	27	27	5.3000000	2.6288342	1.0000000	9.8000000
	Test	21	21	5.1571429	3.2626019	1.0000000	13.7000000
2007	Control	27	27	9.1333333	3.6850008	1.6000000	15.2000000
	Test	27	27	9.3333333	5.8996740	1.6000000	25.0000000
2008	Control	27	27	9.9111111	4.0848061	3.0000000	19.0000000
	Test	27	27	9.7481481	6.7177360	1.0000000	30.6000000
2009	Control	24	24	8.0541667	5.4948180	1.3000000	19.8000000
	Test	27	27	7.2185185	5.6860854	0.7000000	24.3000000

SAR by Year

The MEANS Procedure

Analysis Variable : SAR						
year	N Obs	N	Mean	Std Dev	Minimum	Maximum
2000	54	54	2.5744444	1.2604307	1.0400000	8.0100000
2001	54	54	2.2227778	0.8703619	1.0700000	4.8200000
2002	54	54	2.3012963	0.8126315	1.1500000	4.3100000
2003	54	54	2.6044444	1.0421561	1.1500000	6.1900000
2004	54	54	2.5868519	0.7884229	1.2100000	4.2100000
2005	48	48	2.5485417	0.9034944	1.1700000	5.0300000
2006	48	48	2.9920833	1.3257996	1.3400000	7.3800000
2007	54	54	2.5774074	0.9032712	1.3300000	4.7900000
2008	54	54	2.8974074	0.9969504	1.3100000	5.6200000
2009	51	51	3.0780392	1.0514980	1.5300000	6.0100000

SAR by Farm

The MEANS Procedure

Analysis Variable : SAR						
farm	N Obs	N	Mean	Std Dev	Minimum	Maximum
1	177	177	2.3662712	1.1069182	1.0400000	5.6200000
3	174	174	2.9783333	1.0201400	1.2200000	8.0100000
4	174	174	2.5583908	0.8601316	1.3900000	7.3800000

SAR by Treatment

The MEANS Procedure

Analysis Variable : SAR						
treat	N Obs	N	Mean	Std Dev	Minimum	Maximum
Control	267	267	2.0513483	0.6647729	1.0400000	4.6300000
Test	258	258	3.2345349	0.9995112	1.3000000	8.0100000

SAR by Season

The MEANS Procedure

Analysis Variable : SAR						
season	**N Obs**	**N**	**Mean**	**Std Dev**	**Minimum**	**Maximum**
Fall	171	171	2.5495322	1.0021857	1.0700000	8.0100000
Spring	180	180	2.6408333	1.0726659	1.1000000	7.3800000
Summer	174	174	2.7063218	1.0176075	1.0400000	6.0100000

SAR by Depth

The MEANS Procedure

Analysis Variable : SAR						
depth	N Obs	N	Mean	Std Dev	Minimum	Maximum
1	175	175	2.4958286	0.9335941	1.0400000	6.9600000
2	175	175	2.6174857	0.9517561	1.1000000	7.3800000
3	175	175	2.7850857	1.1776910	1.1400000	8.0100000

SAR by Year and Treatment

The MEANS Procedure

Analysis Variable : SAR							
year	treat	N Obs	N	Mean	Std Dev	Minimum	Maximum
2000	Control	27	27	2.1870370	0.9765946	1.0400000	4.6300000
	Test	27	27	2.9618519	1.4046435	1.3000000	8.0100000
2001	Control	27	27	1.7548148	0.6036579	1.0700000	3.3000000
	Test	27	27	2.6907407	0.8514509	1.4600000	4.8200000
2002	Control	27	27	1.9266667	0.7370784	1.1500000	4.3100000
	Test	27	27	2.6759259	0.7150969	1.4400000	4.0300000
2003	Control	27	27	1.9725926	0.6982208	1.1500000	3.7200000
	Test	27	27	3.2362963	0.9472354	1.8800000	6.1900000
2004	Control	27	27	2.0800000	0.6061670	1.2100000	3.3800000
	Test	27	27	3.0937037	0.6050883	1.8500000	4.2100000
2005	Control	27	27	2.1133333	0.6736354	1.1700000	3.2500000
	Test	21	21	3.1080952	0.8625174	1.7300000	5.0300000
2006	Control	27	27	2.1874074	0.6212617	1.3400000	3.3600000
	Test	21	21	4.0266667	1.2770800	2.0900000	7.3800000
2007	Control	27	27	1.9462963	0.4517926	1.3300000	2.8400000
	Test	27	27	3.2085185	0.7948716	2.1100000	4.7900000
2008	Control	27	27	2.1537037	0.6202614	1.3100000	3.8000000
	Test	27	27	3.6411111	0.7018456	2.4500000	5.6200000
2009	Control	24	24	2.2091667	0.4432873	1.5300000	2.8600000
	Test	27	27	3.8503704	0.7975659	2.6300000	6.0100000

Mixed model for Na

The Mixed Procedure

Model Information	
Data Set	DATALOC.ALLMEASURES
Dependent Variable	Na
Covariance Structure	Compound Symmetry
Subject Effect	farm
Estimation Method	REML
Residual Variance Method	Profile
Fixed Effects SE Method	Model-Based
Degrees of Freedom Method	Between-Within

Class Level Information		
Class	**Levels**	**Values**
year	10	2000 2001 2002 2003 2004 2005 2006 2007 2008 2009
farm	3	1 3 4
treat	2	Control Test
season	3	Fall Spring Summer
depth	3	1 2 3

Dimensions	
Covariance Parameters	2
Columns in X	120
Columns in Z	0
Subjects	3
Max Obs Per Subject	177

Number of Observations	
Number of Observations Read	525
Number of Observations Used	525
Number of Observations Not Used	0

Mixed model for Na

The Mixed Procedure

Iteration History			
Iteration	**Evaluations**	**-2 Res Log Like**	**Criterion**
0	1	2584.26491073	
1	2	2555.80739129	0.00000000

Convergence criteria met.

Covariance Parameter Estimates					
Cov Parm	**Subject**	**Estimate**	**Standard Error**	**Z Value**	**Pr Z**
CS	farm	1.0647	1.1244	0.95	0.3437
Residual		10.4104	0.6902	15.08	<.0001

Fit Statistics	
-2 Res Log Likelihood	2555.8
AIC (smaller is better)	2559.8
AICC (smaller is better)	2559.8
BIC (smaller is better)	2558.0

Null Model Likelihood Ratio Test		
DF	**Chi-Square**	**Pr > ChiSq**
1	28.46	<.0001

Type 3 Tests of Fixed Effects				
Effect	**Num DF**	**Den DF**	**F Value**	**Pr > F**
year	9	18	8.55	<.0001
season	2	4	0.12	0.8865
depth	2	4	1.55	0.3169
treat	1	2	210.50	0.0047
year*season	18	36	1.81	0.0631
year*depth	18	36	0.47	0.9558
year*treat	9	18	0.99	0.4789

Mixed model for Na

The Mixed Procedure

Type 3 Tests of Fixed Effects				
Effect	**Num DF**	**Den DF**	**F Value**	**Pr > F**
season*depth	4	8	3.30	0.0708
treat*season	2	4	0.73	0.5379
treat*depth	2	4	0.91	0.4739

Mixed model for Ca

The Mixed Procedure

Model Information	
Data Set	DATALOC.ALLMEASURES
Dependent Variable	Ca
Covariance Structure	Compound Symmetry
Subject Effect	farm
Estimation Method	REML
Residual Variance Method	Profile
Fixed Effects SE Method	Model-Based
Degrees of Freedom Method	Between-Within

Class Level Information		
Class	**Levels**	**Values**
year	10	2000 2001 2002 2003 2004 2005 2006 2007 2008 2009
farm	3	1 3 4
treat	2	Control Test
season	3	Fall Spring Summer
depth	3	1 2 3

Dimensions	
Covariance Parameters	2
Columns in X	120
Columns in Z	0
Subjects	3
Max Obs Per Subject	177

Number of Observations	
Number of Observations Read	525
Number of Observations Used	525
Number of Observations Not Used	0

Mixed model for Ca

The Mixed Procedure

Iteration History			
Iteration	**Evaluations**	**-2 Res Log Like**	**Criterion**
0	1	3161.95709278	
1	2	3044.52609200	0.00000000

Convergence criteria met.

Covariance Parameter Estimates					
Cov Parm	**Subject**	**Estimate**	**Standard Error**	**Z Value**	**Pr Z**
CS	farm	12.4631	12.6235	0.99	0.3235
Residual		30.1529	1.9991	15.08	<.0001

Fit Statistics	
-2 Res Log Likelihood	3044.5
AIC (smaller is better)	3048.5
AICC (smaller is better)	3048.6
BIC (smaller is better)	3046.7

Null Model Likelihood Ratio Test		
DF	**Chi-Square**	**Pr > ChiSq**
1	117.43	<.0001

Type 3 Tests of Fixed Effects				
Effect	**Num DF**	**Den DF**	**F Value**	**Pr > F**
year	9	18	9.71	<.0001
season	2	4	2.93	0.1643
depth	2	4	18.17	0.0098
treat	1	2	0.46	0.5673
year*season	18	36	1.49	0.1519
year*depth	18	36	1.61	0.1095
year*treat	9	18	2.73	0.0334

Mixed model for Ca

The Mixed Procedure

Type 3 Tests of Fixed Effects				
Effect	Num DF	Den DF	F Value	Pr > F
season*depth	4	8	6.03	0.0154
treat*season	2	4	1.24	0.3813
treat*depth	2	4	0.56	0.6096

Mixed model for Cl

The Mixed Procedure

Model Information	
Data Set	DATALOC.ALLMEASURES
Dependent Variable	Cl
Covariance Structure	Compound Symmetry
Subject Effect	farm
Estimation Method	REML
Residual Variance Method	Profile
Fixed Effects SE Method	Model-Based
Degrees of Freedom Method	Between-Within

Class Level Information		
Class	**Levels**	**Values**
year	10	2000 2001 2002 2003 2004 2005 2006 2007 2008 2009
farm	3	1 3 4
treat	2	Control Test
season	3	Fall Spring Summer
depth	3	1 2 3

Dimensions	
Covariance Parameters	2
Columns in X	120
Columns in Z	0
Subjects	3
Max Obs Per Subject	177

Number of Observations	
Number of Observations Read	525
Number of Observations Used	525
Number of Observations Not Used	0

Mixed model for Cl

The Mixed Procedure

Iteration History			
Iteration	**Evaluations**	**-2 Res Log Like**	**Criterion**
0	1	3183.23352968	
1	2	3125.04795165	0.00000000

Convergence criteria met.

Covariance Parameter Estimates					
Cov Parm	**Subject**	**Estimate**	**Standard Error**	**Z Value**	**Pr Z**
CS	farm	7.2632	7.4690	0.97	0.3308
Residual		36.0737	2.3917	15.08	<.0001

Fit Statistics	
-2 Res Log Likelihood	3125.0
AIC (smaller is better)	3129.0
AICC (smaller is better)	3129.1
BIC (smaller is better)	3127.2

Null Model Likelihood Ratio Test		
DF	**Chi-Square**	**Pr > ChiSq**
1	58.19	<.0001

Type 3 Tests of Fixed Effects				
Effect	**Num DF**	**Den DF**	**F Value**	**Pr > F**
year	9	18	25.66	<.0001
season	2	4	7.29	0.0463
depth	2	4	6.23	0.0591
treat	1	2	3.53	0.2012
year*season	18	36	1.03	0.4537
year*depth	18	36	0.87	0.6104
year*treat	9	18	1.75	0.1502

Mixed model for Cl

The Mixed Procedure

Type 3 Tests of Fixed Effects				
Effect	Num DF	Den DF	F Value	Pr > F
season*depth	4	8	3.73	0.0533
treat*season	2	4	0.89	0.4788
treat*depth	2	4	0.17	0.8487

Mixed model for ECe

The Mixed Procedure

Model Information	
Data Set	DATALOC.ALLMEASURES
Dependent Variable	Ece
Covariance Structure	Compound Symmetry
Subject Effect	farm
Estimation Method	REML
Residual Variance Method	Profile
Fixed Effects SE Method	Model-Based
Degrees of Freedom Method	Between-Within

Class Level Information		
Class	**Levels**	**Values**
year	10	2000 2001 2002 2003 2004 2005 2006 2007 2008 2009
farm	3	1 3 4
treat	2	Control Test
season	3	Fall Spring Summer
depth	3	1 2 3

Dimensions	
Covariance Parameters	2
Columns in X	120
Columns in Z	0
Subjects	3
Max Obs Per Subject	177

Number of Observations	
Number of Observations Read	525
Number of Observations Used	525
Number of Observations Not Used	0

Mixed model for ECe

The Mixed Procedure

Iteration History			
Iteration	**Evaluations**	**-2 Res Log Like**	**Criterion**
0	1	1694.47949218	
1	2	1583.54439208	0.00000000

Convergence criteria met.

Covariance Parameter Estimates					
Cov Parm	**Subject**	**Estimate**	**Standard Error**	**Z Value**	**Pr Z**
CS	farm	0.4794	0.4860	0.99	0.3239
Residual		1.2332	0.08176	15.08	<.0001

Fit Statistics	
-2 Res Log Likelihood	1583.5
AIC (smaller is better)	1587.5
AICC (smaller is better)	1587.6
BIC (smaller is better)	1585.7

Null Model Likelihood Ratio Test		
DF	**Chi-Square**	**Pr > ChiSq**
1	110.94	<.0001

Type 3 Tests of Fixed Effects				
Effect	**Num DF**	**Den DF**	**F Value**	**Pr > F**
year	9	18	12.79	<.0001
season	2	4	1.20	0.3913
depth	2	4	3.45	0.1348
treat	1	2	36.10	0.0266
year*season	18	36	2.67	0.0060
year*depth	18	36	1.35	0.2141
year*treat	9	18	3.12	0.0192

Mixed model for ECe

The Mixed Procedure

Type 3 Tests of Fixed Effects				
Effect	Num DF	Den DF	F Value	Pr > F
season*depth	4	8	6.39	0.0130
treat*season	2	4	1.78	0.2801
treat*depth	2	4	0.65	0.5694

Mixed model for ESP

The Mixed Procedure

Model Information	
Data Set	DATALOC.ALLMEASURES
Dependent Variable	ESP
Covariance Structure	Compound Symmetry
Subject Effect	farm
Estimation Method	REML
Residual Variance Method	Profile
Fixed Effects SE Method	Model-Based
Degrees of Freedom Method	Between-Within

Class Level Information		
Class	**Levels**	**Values**
year	10	2000 2001 2002 2003 2004 2005 2006 2007 2008 2009
farm	3	1 3 4
treat	2	Control Test
season	3	Fall Spring Summer
depth	3	1 2 3

Dimensions	
Covariance Parameters	2
Columns in X	120
Columns in Z	0
Subjects	3
Max Obs Per Subject	177

Number of Observations	
Number of Observations Read	525
Number of Observations Used	525
Number of Observations Not Used	0

Mixed model for ESP

The Mixed Procedure

Iteration History			
Iteration	**Evaluations**	**-2 Res Log Like**	**Criterion**
0	1	1558.73380042	
1	2	1504.40295452	0.00000000

Convergence criteria met.

Covariance Parameter Estimates					
Cov Parm	**Subject**	**Estimate**	**Standard Error**	**Z Value**	**Pr Z**
CS	farm	0.1958	0.2017	0.97	0.3318
Residual		1.0404	0.06898	15.08	<.0001

Fit Statistics	
-2 Res Log Likelihood	1504.4
AIC (smaller is better)	1508.4
AICC (smaller is better)	1508.4
BIC (smaller is better)	1506.6

Null Model Likelihood Ratio Test		
DF	**Chi-Square**	**Pr > ChiSq**
1	54.33	<.0001

Type 3 Tests of Fixed Effects				
Effect	**Num DF**	**Den DF**	**F Value**	**Pr > F**
year	9	18	7.38	0.0002
season	2	4	1.01	0.4406
depth	2	4	6.04	0.0619
treat	1	2	340.02	0.0029
year*season	18	36	1.47	0.1601
year*depth	18	36	1.18	0.3281
year*treat	9	18	2.66	0.0368

Mixed model for ESP

The Mixed Procedure

Type 3 Tests of Fixed Effects				
Effect	**Num DF**	**Den DF**	**F Value**	**Pr > F**
season*depth	4	8	0.45	0.7721
treat*season	2	4	0.34	0.7302
treat*depth	2	4	0.53	0.6251

Mixed model for Mg

The Mixed Procedure

Model Information	
Data Set	DATALOC.ALLMEASURES
Dependent Variable	Mg
Covariance Structure	Compound Symmetry
Subject Effect	farm
Estimation Method	REML
Residual Variance Method	Profile
Fixed Effects SE Method	Model-Based
Degrees of Freedom Method	Between-Within

Class Level Information		
Class	**Levels**	**Values**
year	10	2000 2001 2002 2003 2004 2005 2006 2007 2008 2009
farm	3	1 3 4
treat	2	Control Test
season	3	Fall Spring Summer
depth	3	1 2 3

Dimensions	
Covariance Parameters	2
Columns in X	120
Columns in Z	0
Subjects	3
Max Obs Per Subject	177

Number of Observations	
Number of Observations Read	525
Number of Observations Used	525
Number of Observations Not Used	0

Mixed model for Mg

The Mixed Procedure

Iteration History			
Iteration	Evaluations	-2 Res Log Like	Criterion
0	1	2957.71768345	
1	2	2794.13772025	0.00000000

Convergence criteria met.

Covariance Parameter Estimates					
Cov Parm	Subject	Estimate	Standard Error	Z Value	Pr Z
CS	farm	10.4274	10.5176	0.99	0.3215
Residual		17.4054	1.1540	15.08	<.0001

Fit Statistics	
-2 Res Log Likelihood	2794.1
AIC (smaller is better)	2798.1
AICC (smaller is better)	2798.2
BIC (smaller is better)	2796.3

Null Model Likelihood Ratio Test		
DF	Chi-Square	Pr > ChiSq
1	163.58	<.0001

Type 3 Tests of Fixed Effects				
Effect	Num DF	Den DF	F Value	Pr > F
year	9	18	12.40	<.0001
season	2	4	0.74	0.5330
depth	2	4	1.77	0.2814
treat	1	2	16.27	0.0563
year*season	18	36	1.57	0.1220
year*depth	18	36	1.80	0.0654
year*treat	9	18	2.01	0.0996

Mixed model for Mg

The Mixed Procedure

Type 3 Tests of Fixed Effects				
Effect	**Num DF**	**Den DF**	**F Value**	**Pr > F**
season*depth	4	8	4.88	0.0275
treat*season	2	4	0.67	0.5617
treat*depth	2	4	0.81	0.5060

Mixed model for SAR

The Mixed Procedure

Model Information	
Data Set	DATALOC.ALLMEASURES
Dependent Variable	SAR
Covariance Structure	Compound Symmetry
Subject Effect	farm
Estimation Method	REML
Residual Variance Method	Profile
Fixed Effects SE Method	Model-Based
Degrees of Freedom Method	Between-Within

Class Level Information		
Class	**Levels**	**Values**
year	10	2000 2001 2002 2003 2004 2005 2006 2007 2008 2009
farm	3	1 3 4
treat	2	Control Test
season	3	Fall Spring Summer
depth	3	1 2 3

Dimensions	
Covariance Parameters	2
Columns in X	120
Columns in Z	0
Subjects	3
Max Obs Per Subject	177

Number of Observations	
Number of Observations Read	525
Number of Observations Used	525
Number of Observations Not Used	0

Mixed model for SAR

The Mixed Procedure

Iteration History			
Iteration	**Evaluations**	**-2 Res Log Like**	**Criterion**
0	1	1262.53222802	
1	2	1209.90916450	0.00000000

Convergence criteria met.

Covariance Parameter Estimates					
Cov Parm	**Subject**	**Estimate**	**Standard Error**	**Z Value**	**Pr Z**
CS	farm	0.09967	0.1028	0.97	0.3322
Residual		0.5462	0.03622	15.08	<.0001

Fit Statistics	
-2 Res Log Likelihood	1209.9
AIC (smaller is better)	1213.9
AICC (smaller is better)	1213.9
BIC (smaller is better)	1212.1

Null Model Likelihood Ratio Test		
DF	**Chi-Square**	**Pr > ChiSq**
1	52.62	<.0001

Type 3 Tests of Fixed Effects				
Effect	**Num DF**	**Den DF**	**F Value**	**Pr > F**
year	9	18	7.35	0.0002
season	2	4	1.27	0.3735
depth	2	4	6.39	0.0568
treat	1	2	334.10	0.0030
year*season	18	36	1.50	0.1468
year*depth	18	36	1.22	0.2972
year*treat	9	18	2.74	0.0326

Mixed model for SAR

The Mixed Procedure

Type 3 Tests of Fixed Effects				
Effect	**Num DF**	**Den DF**	**F Value**	**Pr > F**
season*depth	4	8	0.41	0.7961
treat*season	2	4	0.55	0.6136
treat*depth	2	4	0.45	0.6668

Soil Na^+ Compared

Effect	year1	year2	Adjustment	Adj P
year	2000	2001	Tukey-Kramer	1.0000
year	2000	2002	Tukey-Kramer	0.5816
year	2000	2003	Tukey-Kramer	0.0013
year	2000	2004	Tukey-Kramer	0.1592
year	2000	2005	Tukey-Kramer	0.3706
year	2000	2006	Tukey-Kramer	0.0242
year	2000	2007	Tukey-Kramer	0.0122
year	2000	2008	Tukey-Kramer	0.0002
year	2000	2009	Tukey-Kramer	0.0069
year	2001	2002	Tukey-Kramer	0.8451
year	2001	2003	Tukey-Kramer	0.0033
year	2001	2004	Tukey-Kramer	0.3375
year	2001	2005	Tukey-Kramer	0.6329
year	2001	2006	Tukey-Kramer	0.0590
year	2001	2007	Tukey-Kramer	0.0318
year	2001	2008	Tukey-Kramer	0.0004
year	2001	2009	Tukey-Kramer	0.0180
year	2002	2003	Tukey-Kramer	0.0786
year	2002	2004	Tukey-Kramer	0.9939
year	2002	2005	Tukey-Kramer	1.0000
year	2002	2006	Tukey-Kramer	0.6065
year	2002	2007	Tukey-Kramer	0.4653
year	2002	2008	Tukey-Kramer	0.0102
year	2002	2009	Tukey-Kramer	0.3056
year	2003	2004	Tukey-Kramer	0.3610
year	2003	2005	Tukey-Kramer	0.2153
year	2003	2006	Tukey-Kramer	0.9664
year	2003	2007	Tukey-Kramer	0.9776
year	2003	2008	Tukey-Kramer	0.9863
year	2003	2009	Tukey-Kramer	0.9987
year	2004	2005	Tukey-Kramer	1.0000
year	2004	2006	Tukey-Kramer	0.9734
year	2004	2007	Tukey-Kramer	0.9331
year	2004	2008	Tukey-Kramer	0.0634
year	2004	2009	Tukey-Kramer	0.8047
year	2005	2006	Tukey-Kramer	0.8711
year	2005	2007	Tukey-Kramer	0.7756
year	2005	2008	Tukey-Kramer	0.0350
year	2005	2009	Tukey-Kramer	0.5962

year	2006	2007	Tukey-Kramer	1.0000
year	2006	2008	Tukey-Kramer	0.5152
year	2006	2009	Tukey-Kramer	1.0000
year	2007	2008	Tukey-Kramer	0.5297
year	2007	2009	Tukey-Kramer	1.0000
year	2008	2009	Tukey-Kramer	0.7587

Descriptive Statistics: SAR

Results for Site = 1

Variable	Treatment	N	Mean	SE Mean	StDev	Minimum	Maximum
SAR	Control	90	1.3947	0.0271	0.2573	1.0400	2.8900
	Test	87	3.3714	0.0702	0.6551	2.0400	5.6200

Results for Site = 3

Variable	Treatment	N	Mean	SE Mean	StDev	Minimum	Maximum
SAR	Control	90	2.4669	0.0599	0.5685	1.2200	4.3100
	Test	84	3.526	0.121	1.111	1.300	8.010

Results for Site = 4

Variable	Treatment	N	Mean	SE Mean	StDev	Minimum	Maximum
SAR	Control	87	2.3008	0.0556	0.5186	1.6200	4.6300
	Test	87	2.816	0.112	1.042	1.390	7.380

Descriptive Statistics: SAR

Results for Treatment = Control

Variable	Year	N	Mean	SE Mean	StDev	Minimum	Maximum
SAR	2000	27	2.187	0.188	0.977	1.040	4.630
	2001	27	1.755	0.116	0.604	1.070	3.300
	2002	27	1.927	0.142	0.737	1.150	4.310
	2003	27	1.973	0.134	0.698	1.150	3.720
	2004	27	2.080	0.117	0.606	1.210	3.380
	2005	27	2.113	0.130	0.674	1.170	3.250
	2006	27	2.187	0.120	0.621	1.340	3.360
	2007	27	1.9463	0.0869	0.4518	1.3300	2.8400
	2008	27	2.154	0.119	0.620	1.310	3.800
	2009	24	2.2092	0.0905	0.4433	1.5300	2.8600

Results for Treatment = Test

Variable	Year	N	Mean	SE Mean	StDev	Minimum	Maximum
SAR	2000	27	2.962	0.270	1.405	1.300	8.010
	2001	27	2.691	0.164	0.851	1.460	4.820
	2002	27	2.676	0.138	0.715	1.440	4.030
	2003	27	3.236	0.182	0.947	1.880	6.190
	2004	27	3.094	0.116	0.605	1.850	4.210
	2005	21	3.108	0.188	0.863	1.730	5.030
	2006	21	4.027	0.279	1.277	2.090	7.380
	2007	27	3.209	0.153	0.795	2.110	4.790
	2008	27	3.641	0.135	0.702	2.450	5.620
	2009	27	3.850	0.153	0.798	2.630	6.010

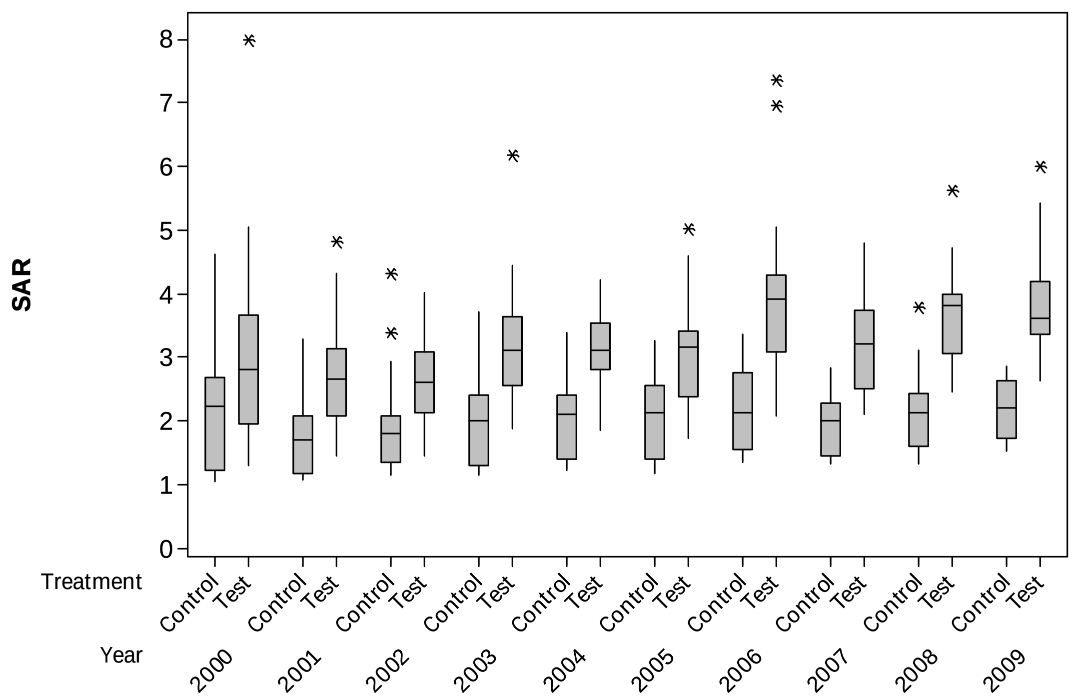
Descriptive Statistics: SAR

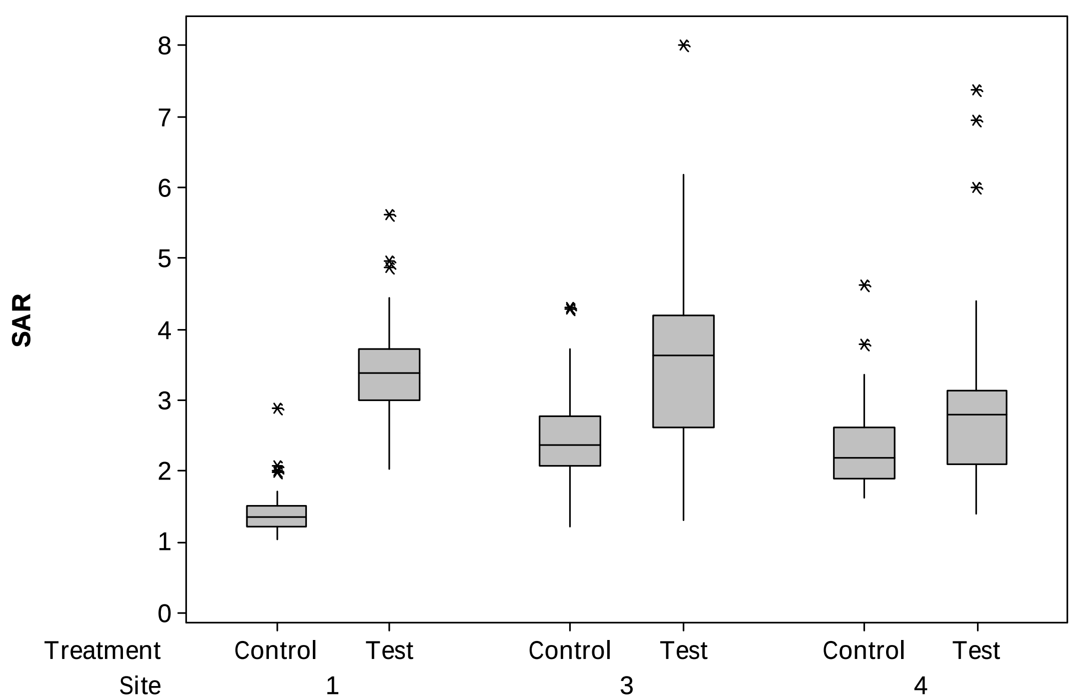
Results for Treatment = Control

Variable	Depth (in.)	N	Mean	SE Mean	StDev	Minimum	Maximum
SAR	1-12	89	1.9130	0.0601	0.5669	1.0400	3.8000
	12-24	89	2.0017	0.0577	0.5442	1.1000	3.3600
	24-36	89	2.2393	0.0862	0.8128	1.1400	4.6300

Results for Treatment = Test

Variable	Depth (in.)	N	Mean	SE Mean	StDev	Minimum	Maximum
SAR	1-12	86	3.0990	0.0920	0.8531	1.3000	6.9600
	12-24	86	3.2548	0.0927	0.8601	1.6100	7.3800
	24-36	86	3.350	0.133	1.233	1.390	8.010




SAR
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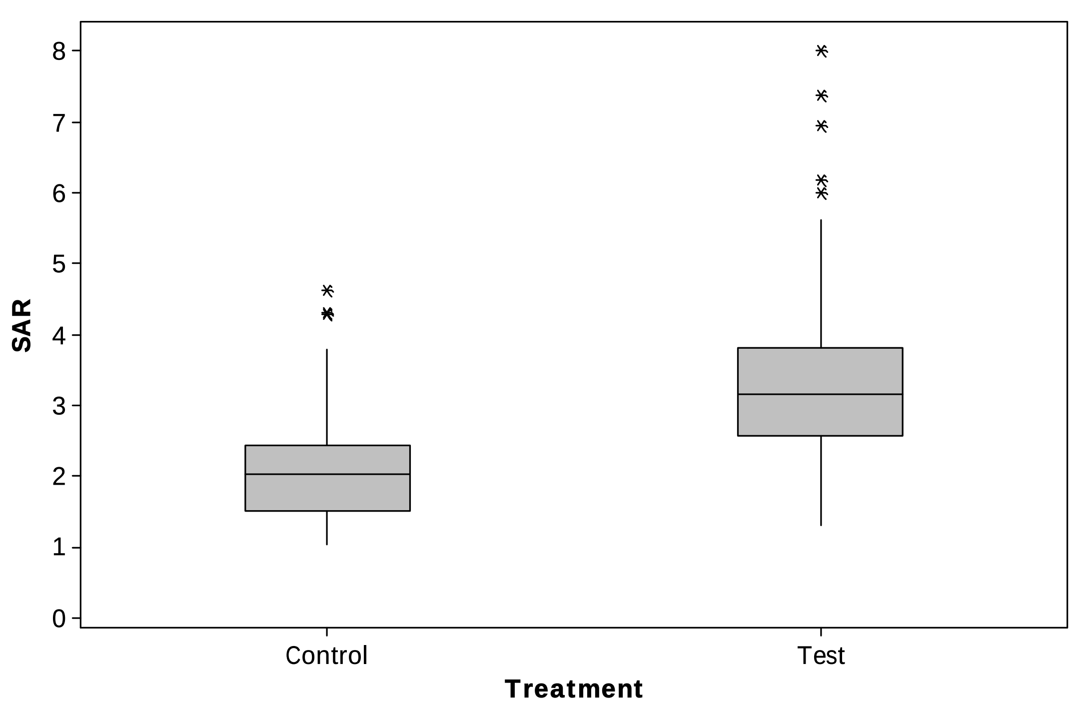
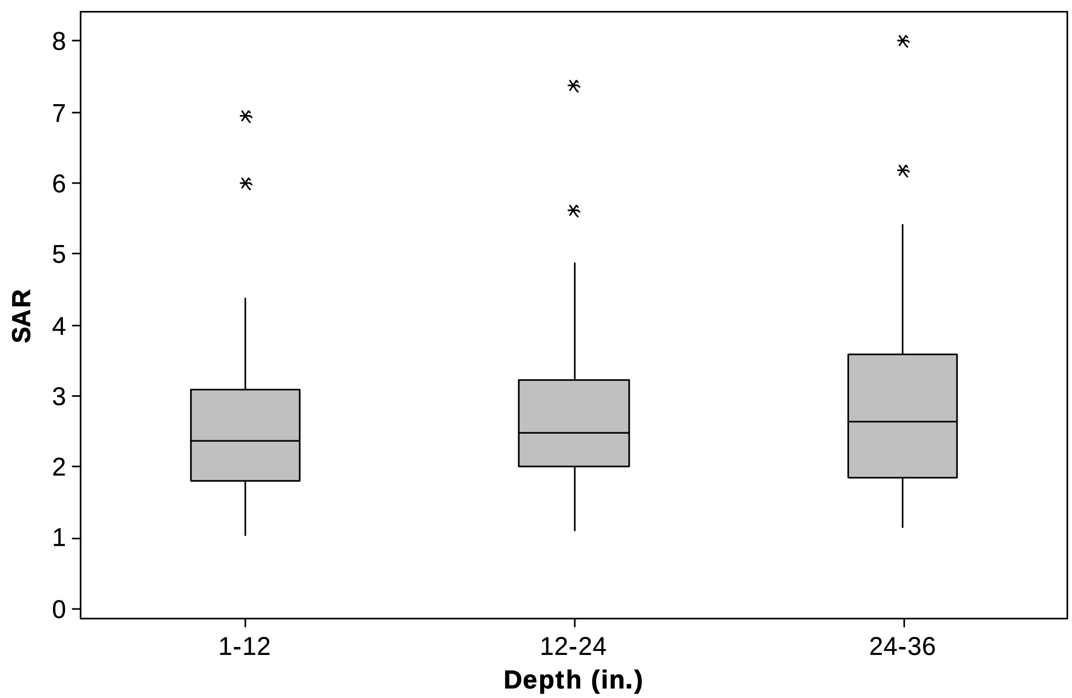
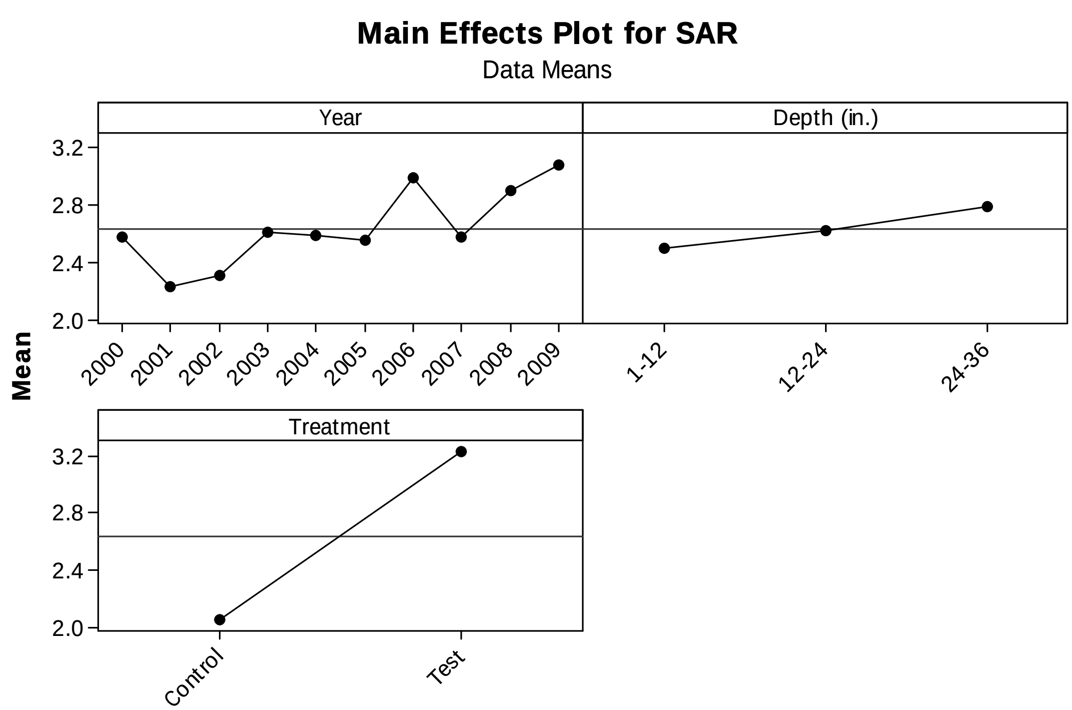
7
6
5
4
3
2
1
0
Treatment
Site
Control
Test
1
Control
Test
3
Control
Test
4


SAR
8
7
6
5
4
3
2
1
0
Control
Test
Treatment



SAR
Depth (in.)
1-12
12-24
24-36



Main Effects Plot for SAR
Data Means
Year
Depth (in.)
Treatment
Mean
Control
Test

Descriptive Statistics: ESP

Results for Site = 1

Variable	Treatment	N	Mean	SE Mean	StDev	Minimum	Maximum
ESP	Control	90	0.7890	0.0433	0.4105	0.0000	2.9200
	Test	87	3.5732	0.0960	0.8957	1.7200	6.5600

Results for Site = 3

Variable	Treatment	N	Mean	SE Mean	StDev	Minimum	Maximum
ESP	Control	90	2.3163	0.0836	0.7934	0.5400	4.8500
	Test	84	3.768	0.164	1.503	0.650	9.540

Results for Site = 4

Variable	Treatment	N	Mean	SE Mean	StDev	Minimum	Maximum
ESP	Control	87	2.0833	0.0778	0.7256	1.1200	5.2800
	Test	87	2.792	0.151	1.411	0.780	8.770

Descriptive Statistics: ESP

Results for Treatment = Control

Variable	Year	N	Mean	SE Mean	StDev	Minimum	Maximum
ESP	2000	27	1.910	0.264	1.369	0.280	5.280
	2001	27	1.303	0.166	0.862	0.310	3.480
	2002	27	1.550	0.199	1.036	0.440	4.850
	2003	27	1.609	0.201	1.045	0.000	4.050
	2004	27	1.769	0.166	0.861	0.520	3.590
	2005	27	1.814	0.184	0.954	0.470	3.410
	2006	27	1.920	0.169	0.879	0.710	3.560
	2007	27	1.580	0.124	0.644	0.700	2.840
	2008	27	1.873	0.168	0.875	0.670	4.160
	2009	24	1.955	0.128	0.629	0.980	2.870

Results for Treatment = Test

Variable	Year	N	Mean	SE Mean	StDev	Minimum	Maximum
ESP	2000	27	2.980	0.363	1.886	0.650	9.540
	2001	27	2.623	0.227	1.181	0.880	5.530
	2002	27	2.606	0.192	0.999	0.860	4.470
	2003	27	3.379	0.247	1.285	1.490	7.290
	2004	27	3.191	0.162	0.841	1.450	4.720
	2005	21	3.204	0.259	1.186	1.270	5.810
	2006	21	4.440	0.367	1.683	1.780	8.770
	2007	27	3.346	0.210	1.093	1.820	5.490
	2008	27	3.940	0.183	0.950	2.300	6.560
	2009	27	4.223	0.206	1.068	2.560	7.070

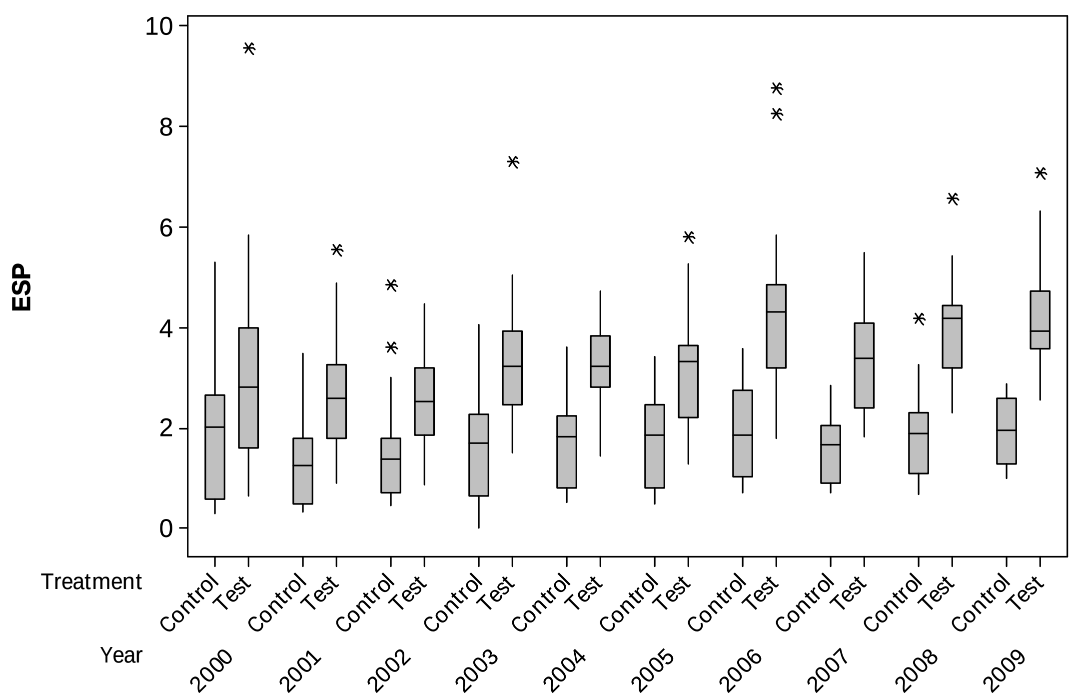
Descriptive Statistics: ESP

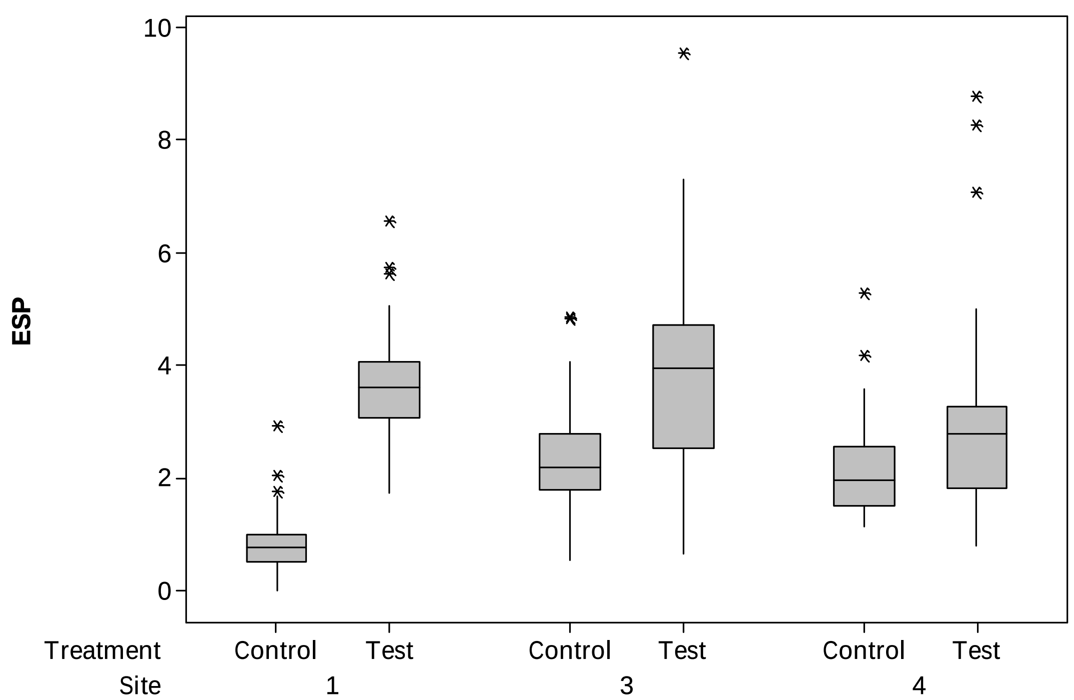
Results for Treatment = Control

Variable	Depth (in.)	N	Mean	SE Mean	StDev	Minimum	Maximum
ESP	1-12	89	1.5393	0.0862	0.8132	0.0000	4.1600
	12-24	89	1.6535	0.0830	0.7827	0.1800	3.5600
	24-36	89	1.984	0.122	1.149	0.110	5.280

Results for Treatment = Test

Variable	Depth (in.)	N	Mean	SE Mean	StDev	Minimum	Maximum
ESP	1-12	86	3.192	0.125	1.162	0.650	8.260
	12-24	86	3.406	0.126	1.165	1.100	8.770
	24-36	86	3.522	0.181	1.677	0.780	9.540





10
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ESP
Treatment
Control
Test
Control
Test
Control
Test
Site
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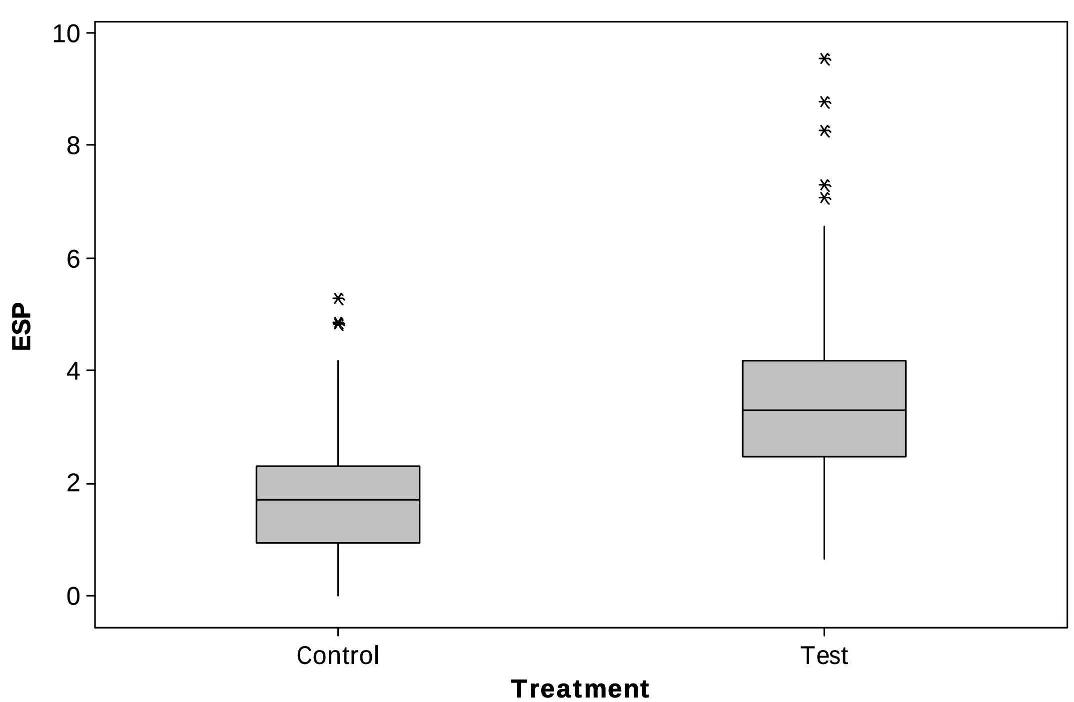
3
4



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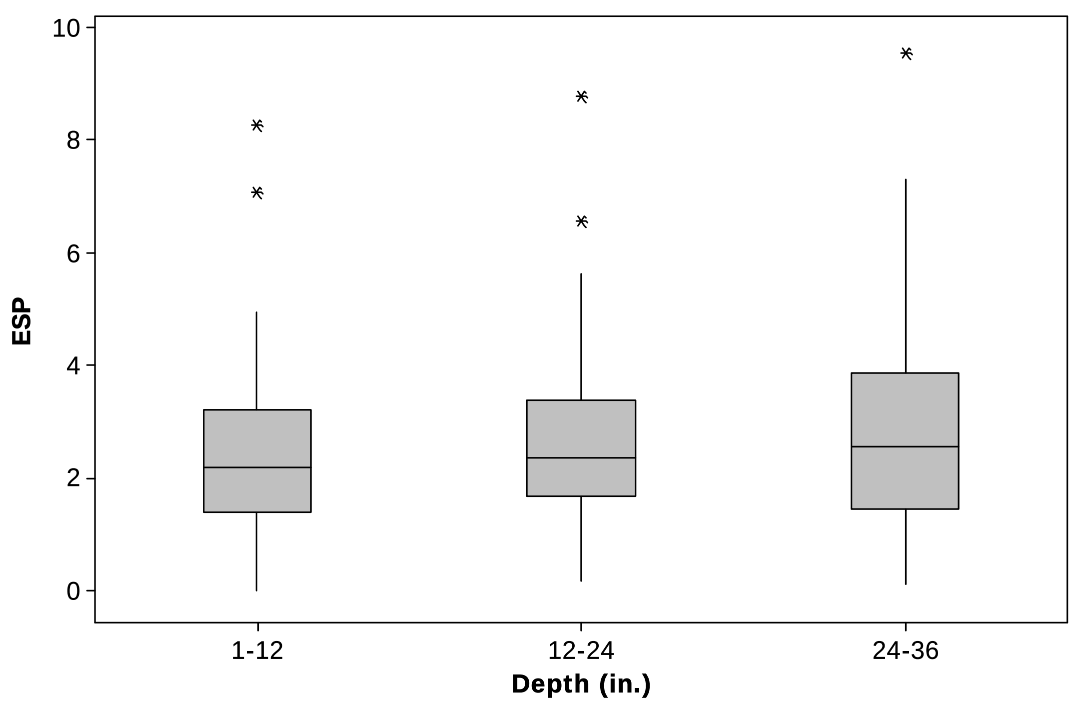
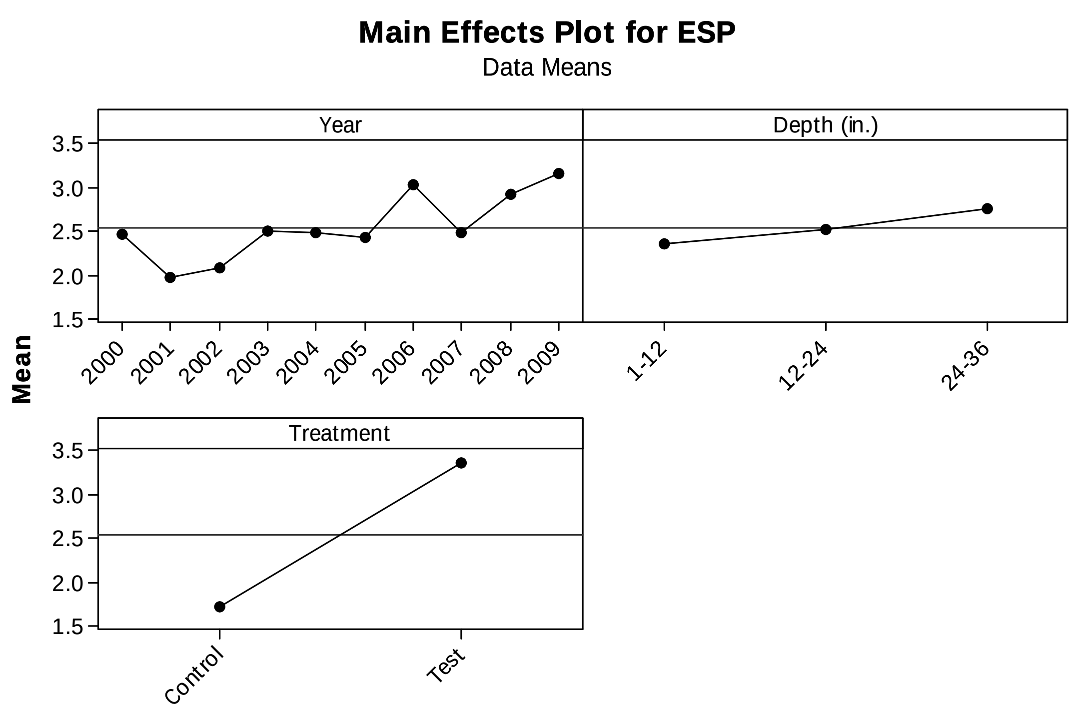
ESP
Control
Test
Treatment



ESP
Depth (in.)
1-12
12-24
24-36



Main Effects Plot for ESP
Data Means
Year
Depth (in.)
Treatment
Mean
Control
Test

Descriptive Statistics: ECe (meq/L)

Results for Site = 1

Variable	Treatment	N	Mean	SE Mean	StDev	Minimum	Maximum
ECe (meq/L)	Control	90	2.706	0.135	1.276	0.600	6.250
	Test	87	4.086	0.156	1.459	1.150	10.250

Results for Site = 3

Variable	Treatment	N	Mean	SE Mean	StDev	Minimum	Maximum
ECe (meq/L)	Control	90	1.3401	0.0746	0.7078	0.2900	4.1000
	Test	84	2.957	0.126	1.159	0.770	6.280

Results for Site = 4

Variable	Treatment	N	Mean	SE Mean	StDev	Minimum	Maximum
ECe (meq/L)	Control	87	2.841	0.110	1.028	0.820	5.790
	Test	87	1.652	0.110	1.027	0.530	7.200

Descriptive Statistics: ECe (meq/L)

Results for Treatment = Control

Variable	Year	N	Mean	SE Mean	StDev	Minimum	Maximum
ECe (meq/L)	2000	27	1.363	0.165	0.856	0.450	3.930
	2001	27	1.658	0.201	1.043	0.290	4.600
	2002	27	2.446	0.232	1.206	0.600	5.120
	2003	27	2.662	0.185	0.960	0.860	4.210
	2004	27	2.076	0.229	1.191	0.530	5.620
	2005	27	2.008	0.153	0.798	0.890	3.860
	2006	27	2.245	0.185	0.962	0.660	3.930
	2007	27	2.702	0.216	1.122	0.930	5.790
	2008	27	3.204	0.274	1.423	1.190	5.760
	2009	24	2.562	0.333	1.629	0.600	6.250

Results for Treatment = Test

Variable	Year	N	Mean	SE Mean	StDev	Minimum	Maximum
ECe (meq/L)	2000	27	2.000	0.220	1.142	0.660	4.680
	2001	27	2.757	0.274	1.423	0.590	5.660
	2002	27	3.186	0.315	1.635	0.830	6.280
	2003	27	4.451	0.405	2.104	1.200	10.250
	2004	27	2.590	0.219	1.140	0.950	4.750
	2005	21	2.599	0.277	1.269	0.720	4.810
	2006	21	2.564	0.222	1.015	1.310	4.550
	2007	27	2.945	0.276	1.433	0.900	6.660
	2008	27	3.268	0.343	1.782	0.640	8.980
	2009	27	2.474	0.251	1.305	0.530	5.570

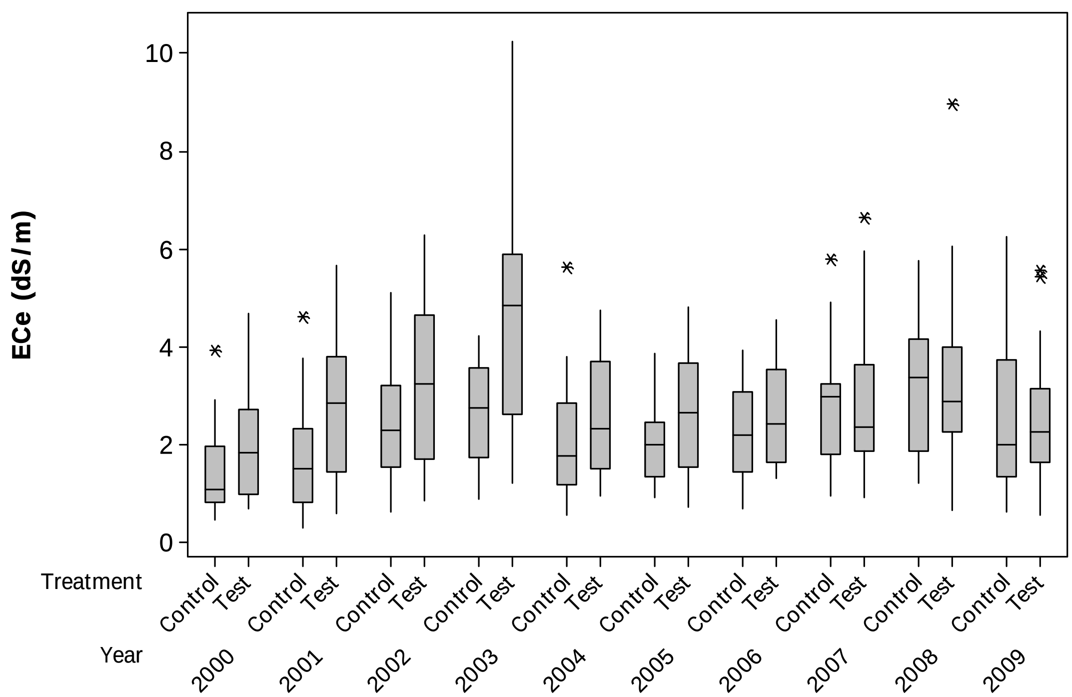
Descriptive Statistics: ECe (meq/L)

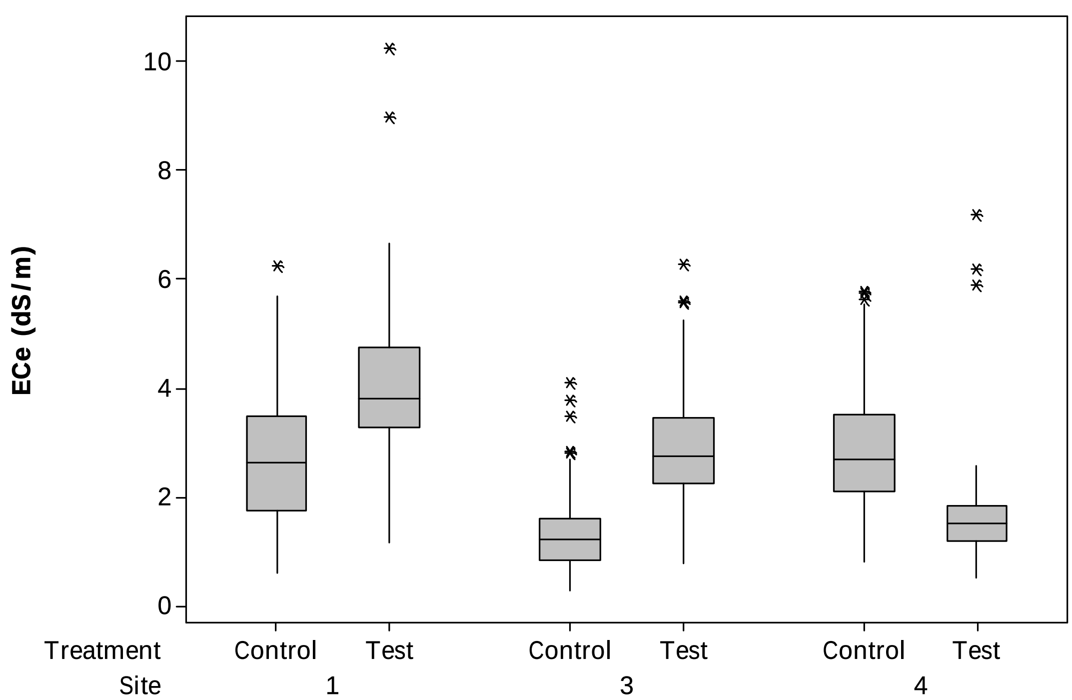
Results for Treatment = Control

Variable	Depth (in.)	N	Mean	SE Mean	StDev	Minimum	Maximum
ECe (meq/L)	1-12	89	2.370	0.151	1.428	0.470	6.250
	12-24	89	2.325	0.127	1.202	0.290	5.760
	24-36	89	2.174	0.110	1.040	0.520	5.400

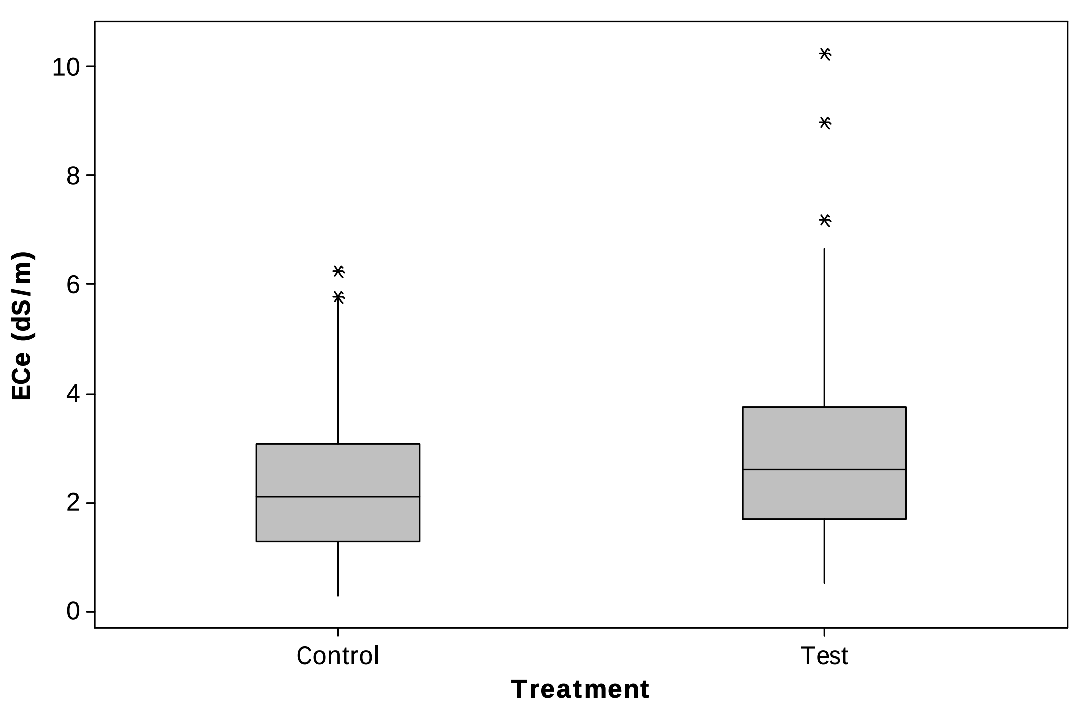
Results for Treatment = Test

Variable	Depth (in.)	N	Mean	SE Mean	StDev	Minimum	Maximum
ECe (meq/L)	1-12	86	2.975	0.179	1.658	0.530	6.570
	12-24	86	3.069	0.191	1.775	0.560	10.250
	24-36	86	2.649	0.135	1.252	0.810	6.200





ECe (dS/m)
10
8
6
4
2
0
Treatment
Control
Test
Control
Test
Control
Test
Site
1
3
4



ECe (dS/m)
10
8
6
4
2
0
Control
Test
Treatment

Descriptive Statistics: Na (meq/L)

Variable	Treatment	N	Mean	SE Mean	StDev	Minimum	Maximum
Na (meq/L)	Control	267	5.582	0.140	2.295	1.200	17.000
	Test	258	9.730	0.282	4.526	2.300	31.200

Descriptive Statistics: Na (meq/L)

Results for Site = 1

Variable	Treatment	N	Mean	SE Mean	StDev	Minimum	Maximum
Na (meq/L)	Control	90	4.638	0.185	1.754	1.600	10.600
	Test	87	12.951	0.479	4.470	4.000	31.200

Results for Site = 3

Variable	Treatment	N	Mean	SE Mean	StDev	Minimum	Maximum
Na (meq/L)	Control	90	4.766	0.158	1.495	1.200	9.100
	Test	84	10.393	0.353	3.234	2.300	24.400

Results for Site = 4

Variable	Treatment	N	Mean	SE Mean	StDev	Minimum	Maximum
Na (meq/L)	Control	87	7.403	0.258	2.411	3.500	17.000
	Test	87	5.870	0.243	2.271	2.300	13.600

Descriptive Statistics: Na (meq/L)

Results for Treatment = Control

Variable	Year	N	Mean	SE Mean	StDev	Minimum	Maximum
Na (meq/L)	2000	27	4.285	0.440	2.288	1.600	10.200
	2001	27	3.889	0.302	1.568	1.200	8.000
	2002	27	5.122	0.249	1.292	2.600	8.000
	2003	27	5.970	0.410	2.128	2.200	9.900
	2004	27	5.311	0.315	1.638	2.400	9.300
	2005	27	5.481	0.409	2.125	2.600	11.700
	2006	27	5.841	0.354	1.837	2.800	10.000
	2007	27	6.252	0.413	2.144	3.800	13.400
	2008	27	7.367	0.618	3.210	3.500	17.000
	2009	24	6.392	0.480	2.353	2.200	12.400

Results for Treatment = Test

Variable	Year	N	Mean	SE Mean	StDev	Minimum	Maximum
Na (meq/L)	2000	27	6.937	0.694	3.608	2.300	13.600
	2001	27	7.922	0.610	3.168	2.300	13.400
	2002	27	8.641	0.689	3.578	3.000	14.600
	2003	27	11.95	1.13	5.85	4.80	30.40
	2004	27	9.585	0.705	3.664	4.300	15.700
	2005	21	9.014	0.835	3.827	3.800	15.500
	2006	21	10.600	0.775	3.549	4.400	16.400
	2007	27	10.296	0.832	4.321	3.800	20.400
	2008	27	11.83	1.07	5.54	3.30	31.20
	2009	27	10.559	0.945	4.908	3.200	23.000

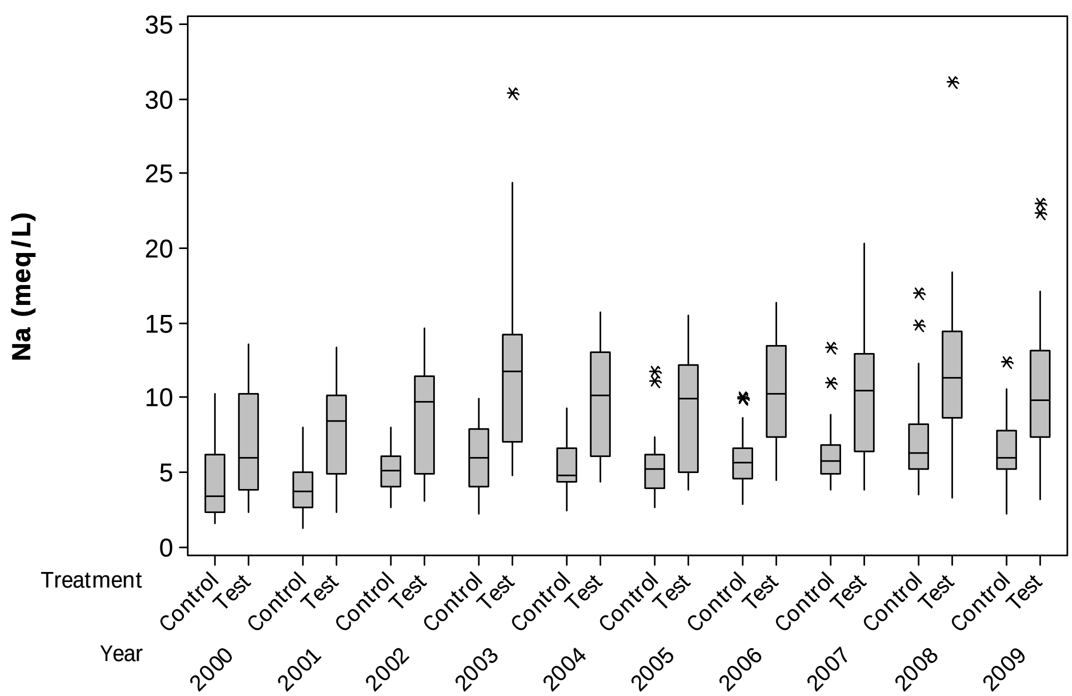
Descriptive Statistics: Na (meq/L)

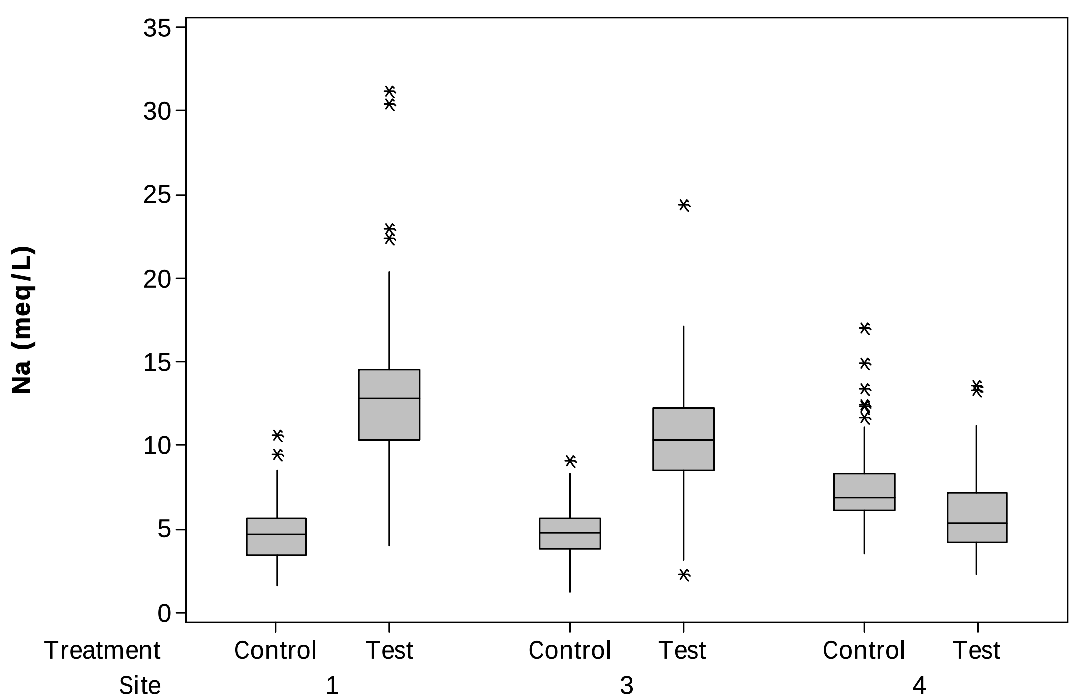
Results for Treatment = Control

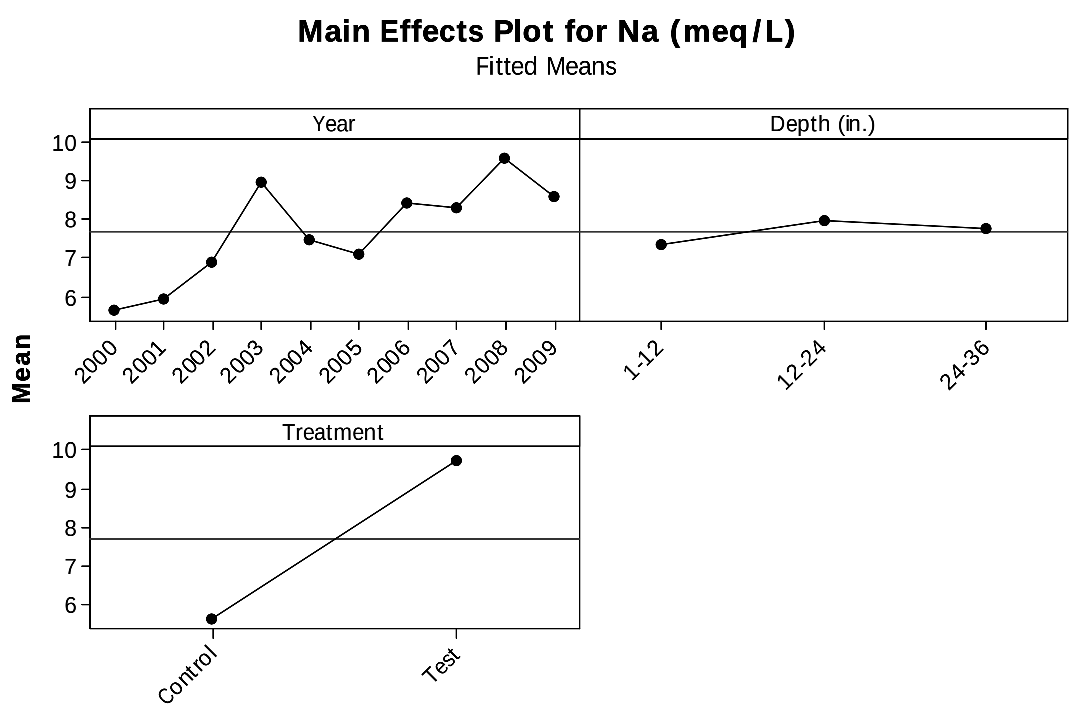
Variable	Depth (in.)	N	Mean	SE Mean	StDev	Minimum	Maximum
Na (meq/L)	1-12	89	5.446	0.286	2.702	1.600	17.000
	12-24	89	5.606	0.242	2.284	1.200	14.900
	24-36	89	5.694	0.195	1.836	2.200	10.900

Results for Treatment = Test

Variable	Depth (in.)	N	Mean	SE Mean	StDev	Minimum	Maximum
Na (meq/L)	1-12	86	9.195	0.387	3.591	2.300	18.800
	12-24	86	10.284	0.564	5.233	2.300	31.200
	24-36	86	9.712	0.495	4.590	2.800	24.400




Na (meq/L)
35
30
25
20
15
10
5
0
Treatment
Control
Test
Control
Test
Control
Test
Site
1
3
4


Main Effects Plot for Na (meq/L)
Fitted Means
Year
Depth (in.)
Mean
10
9
8
7
6
2000
2001
2002
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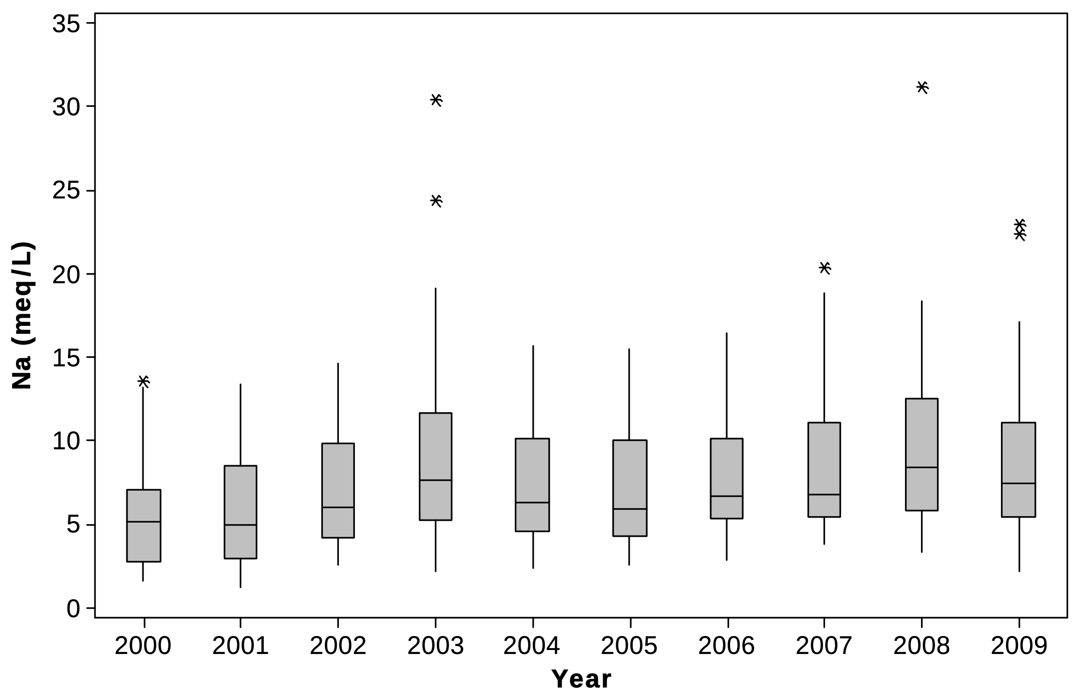
2004
2005
2006
2007
2008
2009
1-12
12-24
24-36
Treatment
Control
Test



Na (meq/L)
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15
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30
35
2000
2001
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2003
2004
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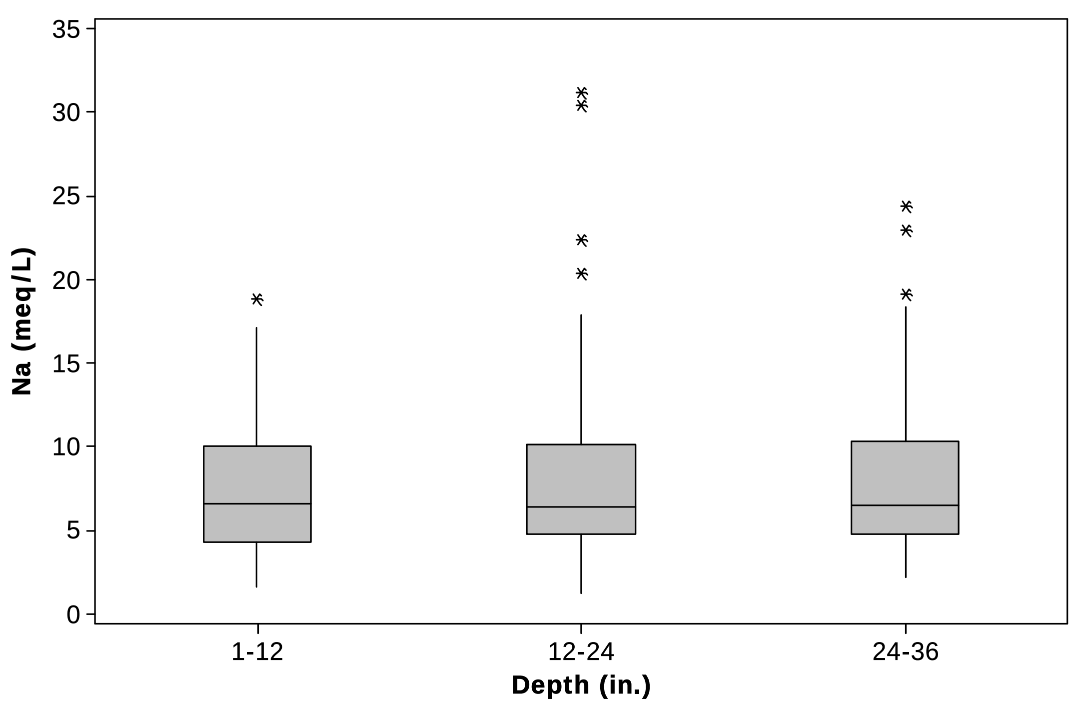
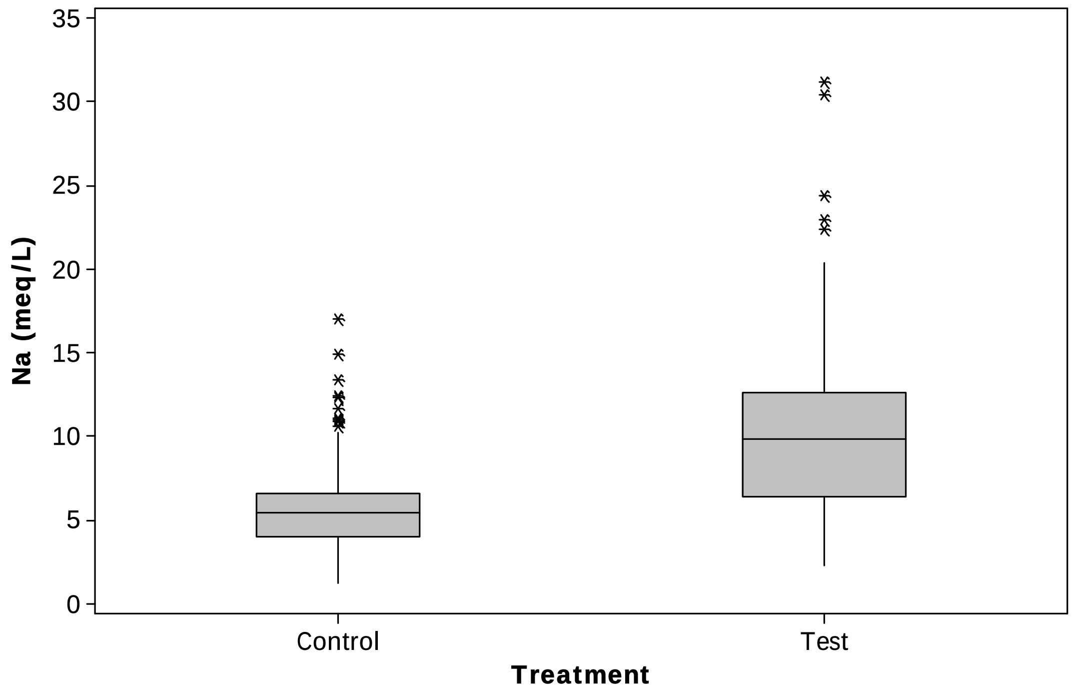
2006
2007
2008
2009
Year



Na (meq/L)
0
5
10
15
20
25
30
35
1-12
12-24
24-36
Depth (in.)



Na (meq/L)
35
30
25
20
15
10
5
0
Control
Test
Treatment

Descriptive Statistics: Ca (meq/L)

Results for Site = 1

Variable	Treatment	N	Mean	SE Mean	StDev	Minimum	Maximum
Ca (meq/L)	Control	90	13.713	0.756	7.168	2.400	37.600
	Test	87	15.470	0.715	6.670	3.700	46.100

Results for Site = 3

Variable	Treatment	N	Mean	SE Mean	StDev	Minimum	Maximum
Ca (meq/L)	Control	90	4.376	0.333	3.159	0.500	16.000
	Test	84	11.467	0.671	6.147	0.300	29.500

Results for Site = 4

Variable	Treatment	N	Mean	SE Mean	StDev	Minimum	Maximum
Ca (meq/L)	Control	87	13.268	0.646	6.027	3.300	30.200
	Test	87	5.503	0.245	2.284	1.200	11.800

Descriptive Statistics: Ca (meq/L)

Results for Treatment = Control

Variable	Year	N	Mean	SE Mean	StDev	Minimum	Maximum
Ca (meq/L)	2000	27	5.107	0.892	4.633	0.500	21.900
	2001	27	7.21	1.09	5.66	0.90	25.10
	2002	27	10.70	1.27	6.59	1.40	27.60
	2003	27	11.159	0.907	4.711	1.900	18.800
	2004	27	9.24	1.30	6.74	1.60	31.80
	2005	27	8.737	0.941	4.890	1.700	21.200
	2006	27	11.42	1.23	6.38	2.10	24.20
	2007	27	13.74	1.41	7.33	2.10	30.20
	2008	27	15.16	1.63	8.46	2.90	30.30
	2009	24	11.90	1.99	9.75	1.80	37.60

Results for Treatment = Test

Variable	Year	N	Mean	SE Mean	StDev	Minimum	Maximum
Ca (meq/L)	2000	27	6.556	0.818	4.249	0.300	19.200
	2001	27	10.44	1.33	6.90	1.90	25.10
	2002	27	12.19	1.49	7.74	2.70	29.50
	2003	27	15.20	1.88	9.77	4.10	46.10
	2004	27	10.80	1.04	5.43	3.20	22.00
	2005	21	9.83	1.17	5.35	2.00	18.70
	2006	21	10.05	1.01	4.64	3.30	19.90
	2007	27	11.70	1.10	5.72	3.00	25.40
	2008	27	11.84	1.30	6.76	1.80	31.10
	2009	27	9.07	1.19	6.21	1.20	27.40

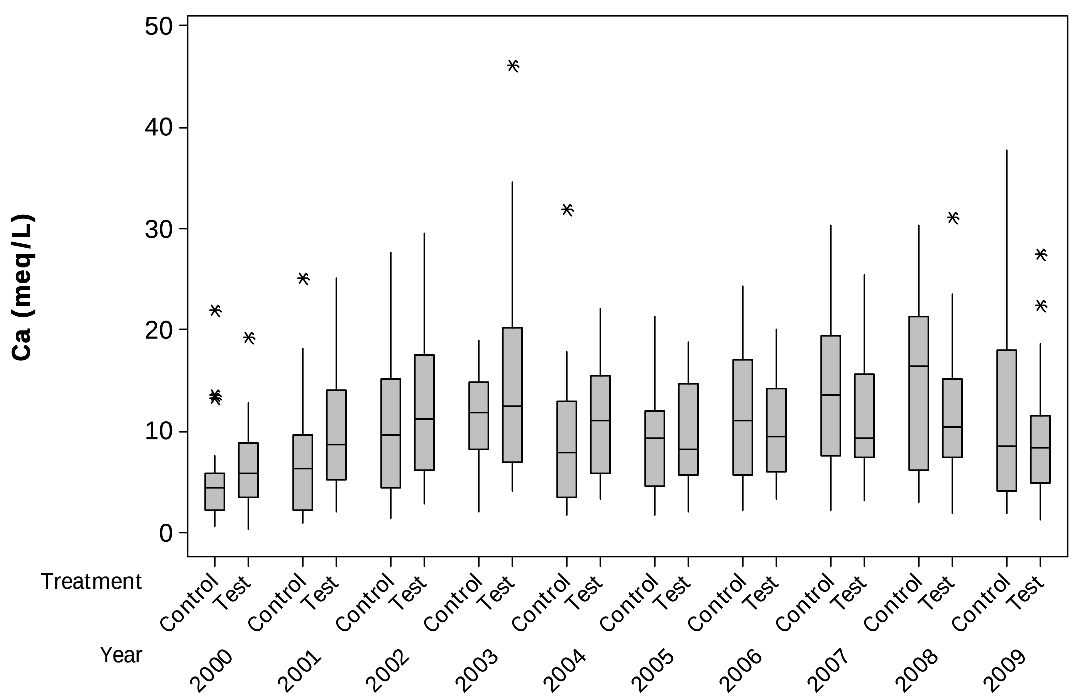
Descriptive Statistics: Ca (meq/L)

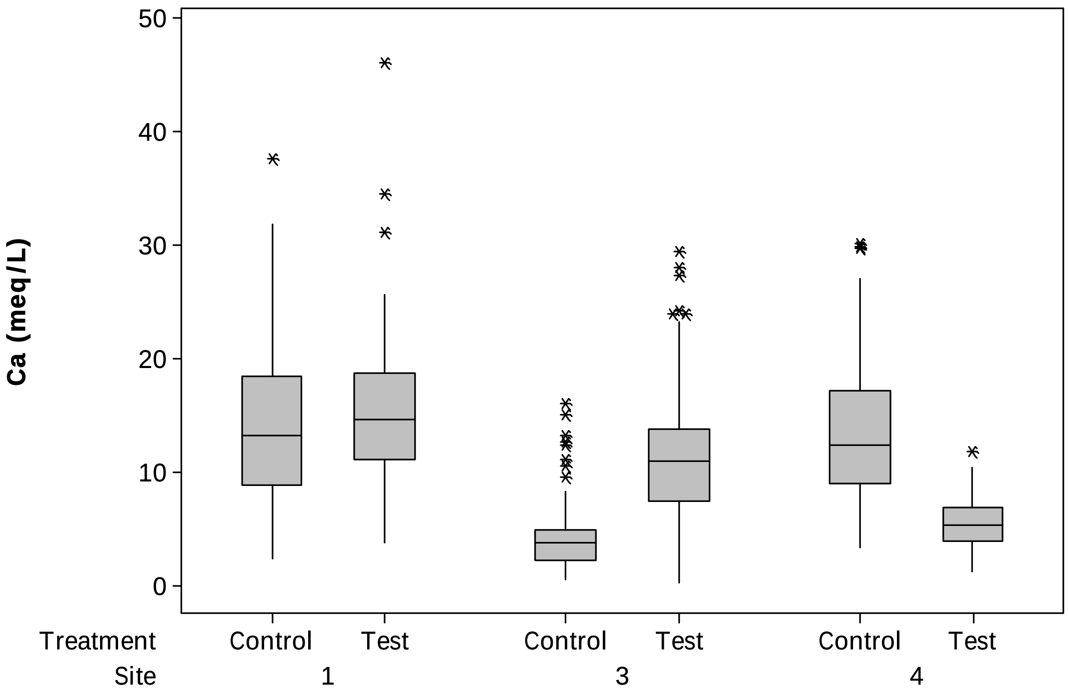
Results for Treatment = Control

Variable	Depth (in.)	N	Mean	SE Mean	StDev	Minimum	Maximum
Ca (meq/L)	1-12	89	11.709	0.875	8.255	1.200	37.600
	12-24	89	10.767	0.730	6.883	1.000	30.300
	24-36	89	8.785	0.618	5.832	0.500	26.300

Results for Treatment = Test

Variable	Depth (in.)	N	Mean	SE Mean	StDev	Minimum	Maximum
Ca (meq/L)	1-12	86	12.594	0.851	7.888	1.200	34.500
	12-24	86	11.271	0.767	7.112	1.300	46.100
	24-36	86	8.552	0.448	4.155	0.300	22.400




50
40
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10
0
Ca (meq/L)
Treatment
Control
Test
Control
Test
Control
Test
Site
1
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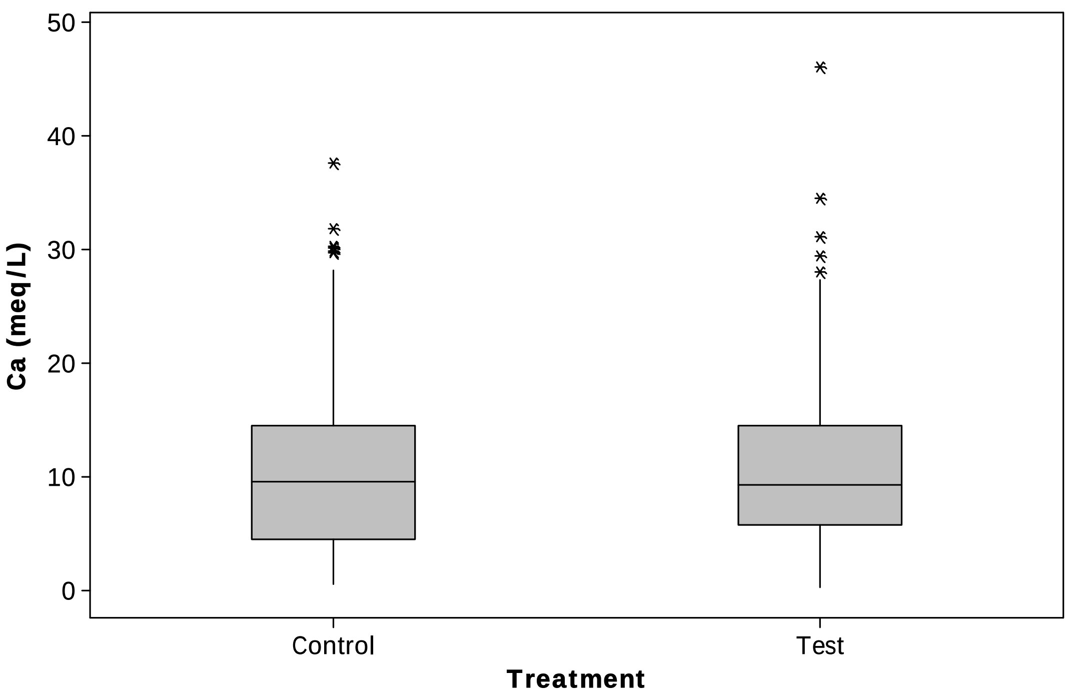
50
40
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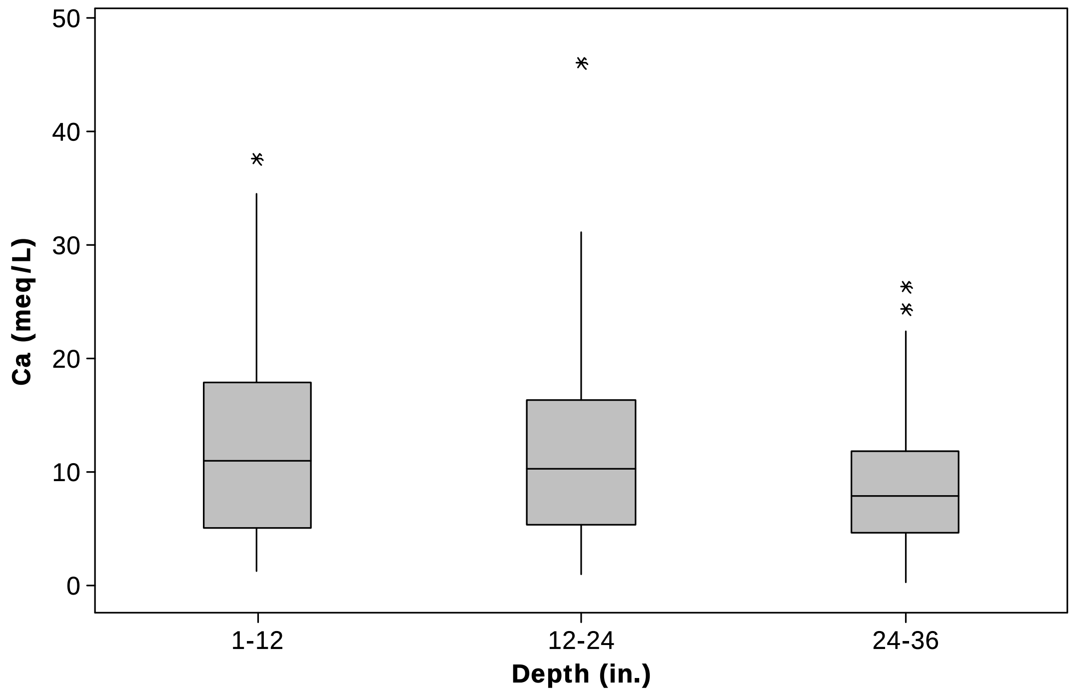
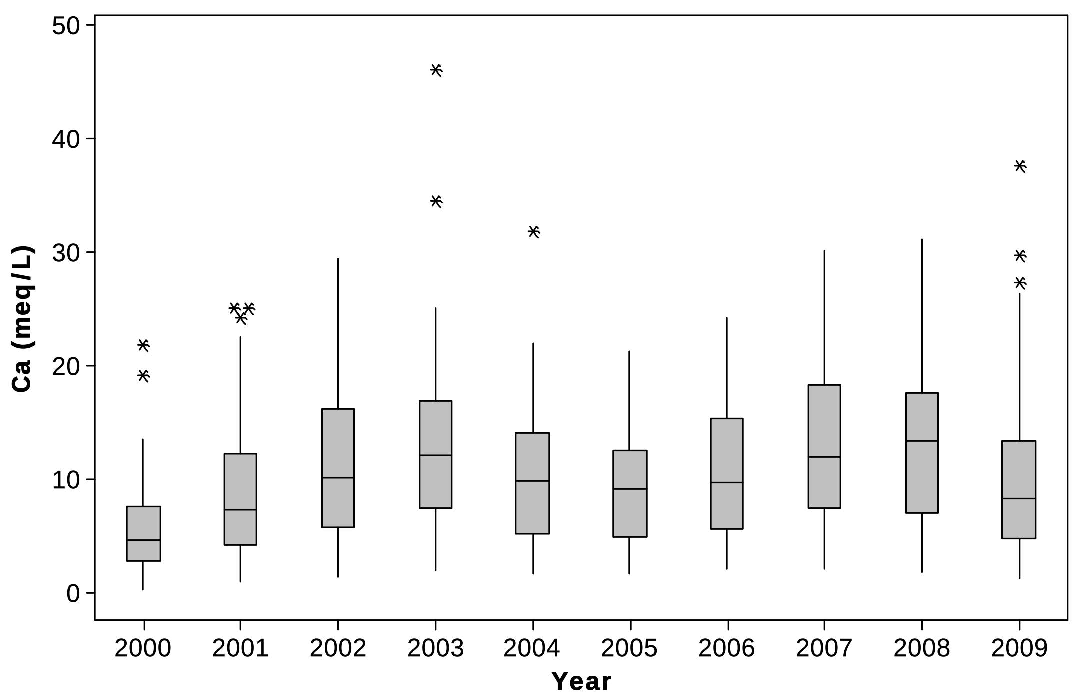
20
10
0
Ca (meq/L)
Control
Test
Treatment



50
40
30
20
10
0
Ca (meq/L)
1-12
12-24
24-36
Depth (in.)



50
40
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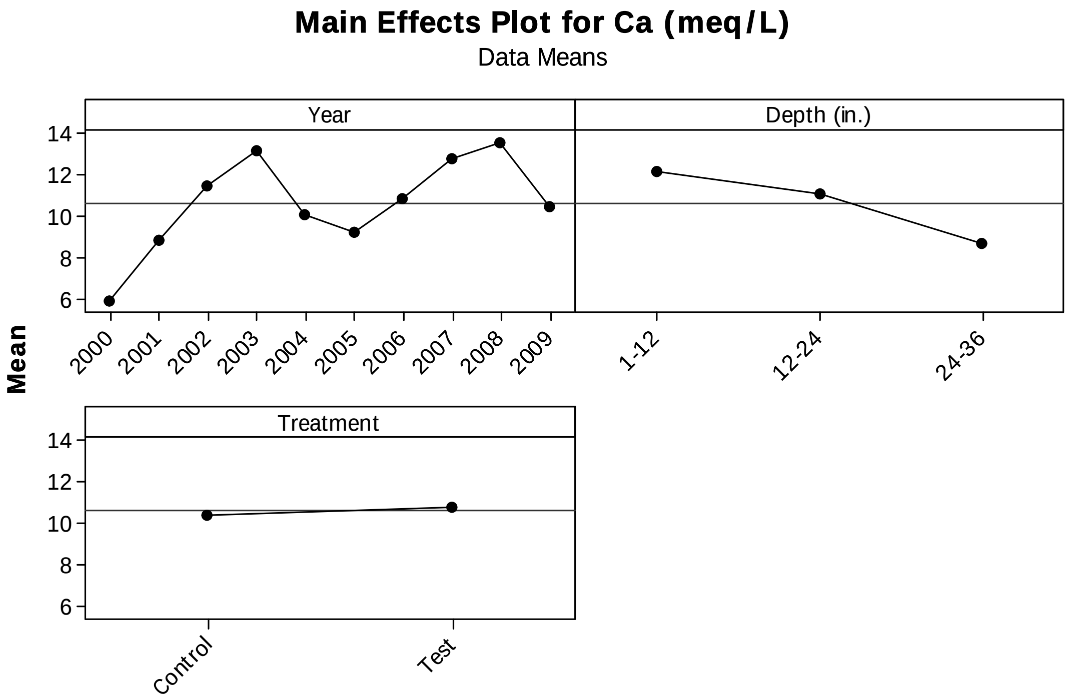
10
0
Ca (meq/L)
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
Year


Main Effects Plot for Ca (meq/L)
Data Means
Year
Depth (in.)
Treatment
Mean
14
12
10
8
6
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
1-12
12-24
24-36
Control
Test

Descriptive Statistics: Mg (meq/L)

Results for Site = 1

Variable	Treatment	N	Mean	SE Mean	StDev	Minimum	Maximum
Mg (meq/L)	Control	90	9.233	0.483	4.582	1.300	19.800
	Test	87	14.429	0.716	6.677	3.400	47.100

Results for Site = 3

Variable	Treatment	N	Mean	SE Mean	StDev	Minimum	Maximum
Mg (meq/L)	Control	90	4.280	0.326	3.095	0.500	17.000
	Test	84	8.350	0.450	4.125	0.800	20.300

Results for Site = 4

Variable	Treatment	N	Mean	SE Mean	StDev	Minimum	Maximum
Mg (meq/L)	Control	87	8.292	0.371	3.463	1.000	17.800
	Test	87	3.814	0.189	1.766	0.700	7.400

Descriptive Statistics: Mg (meq/L)

Results for Treatment = Control

Variable	Year	N	Mean	SE Mean	StDev	Minimum	Maximum
Mg (meq/L)	2000	27	4.041	0.500	2.600	0.700	10.200
	2001	27	5.207	0.725	3.766	0.500	15.200
	2002	27	8.326	0.956	4.970	1.100	17.500
	2003	27	9.285	0.787	4.088	2.600	17.800
	2004	27	7.263	0.897	4.659	1.000	19.000
	2005	27	6.137	0.500	2.597	1.800	13.000
	2006	27	5.300	0.506	2.629	1.000	9.800
	2007	27	9.133	0.709	3.685	1.600	15.200
	2008	27	9.911	0.786	4.085	3.000	19.000
	2009	24	8.05	1.12	5.49	1.30	19.80

Results for Treatment = Test

Variable	Year	N	Mean	SE Mean	StDev	Minimum	Maximum
Mg (meq/L)	2000	27	6.052	0.837	4.348	0.800	15.100
	2001	27	8.607	0.937	4.868	0.900	18.000
	2002	27	10.58	1.25	6.49	1.30	21.10
	2003	27	13.61	1.86	9.68	2.40	47.10
	2004	27	9.21	1.05	5.45	1.70	18.60
	2005	21	8.21	1.20	5.49	0.80	20.60
	2006	21	5.157	0.712	3.263	1.000	13.700
	2007	27	9.33	1.14	5.90	1.60	25.00
	2008	27	9.75	1.29	6.72	1.00	30.60
	2009	27	7.22	1.09	5.69	0.70	24.30

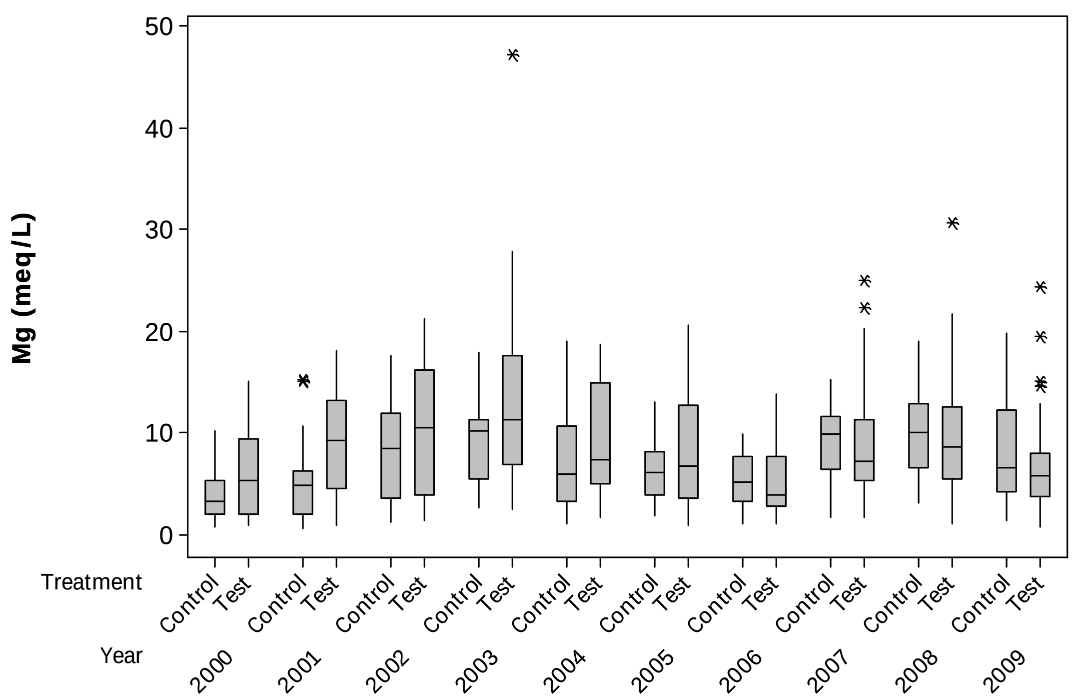
Descriptive Statistics: Mg (meq/L)

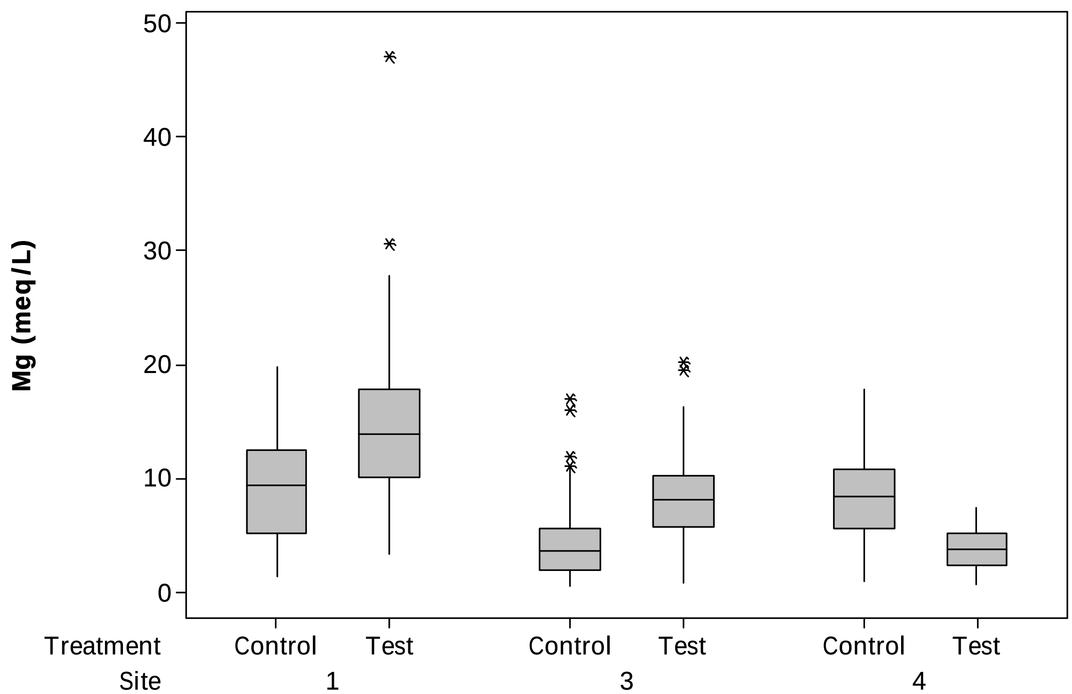
Results for Treatment = Control

Variable	Depth (in.)	N	Mean	SE Mean	StDev	Minimum	Maximum
Mg (meq/L)	1-12	89	6.797	0.485	4.575	0.800	19.000
	12-24	89	7.306	0.442	4.173	0.500	19.000
	24-36	89	7.669	0.450	4.245	1.100	19.800

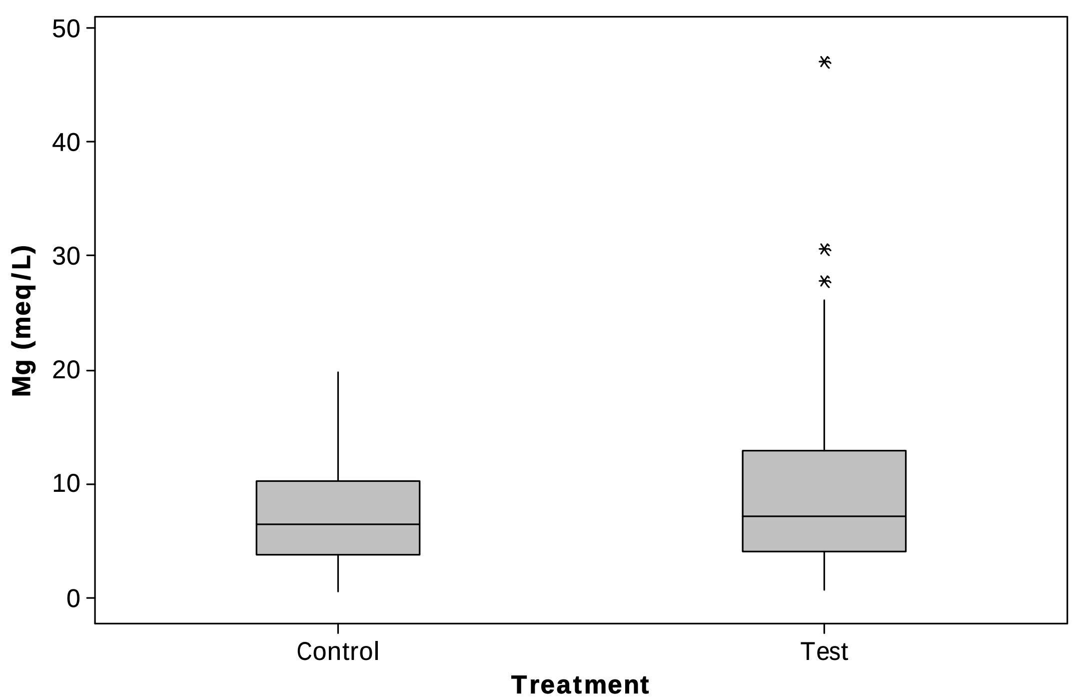
Results for Treatment = Test

Variable	Depth (in.)	N	Mean	SE Mean	StDev	Minimum	Maximum
Mg (meq/L)	1-12	86	8.360	0.690	6.403	0.700	27.800
	12-24	86	9.505	0.788	7.304	0.800	47.100
	24-36	86	8.745	0.570	5.282	1.000	26.200

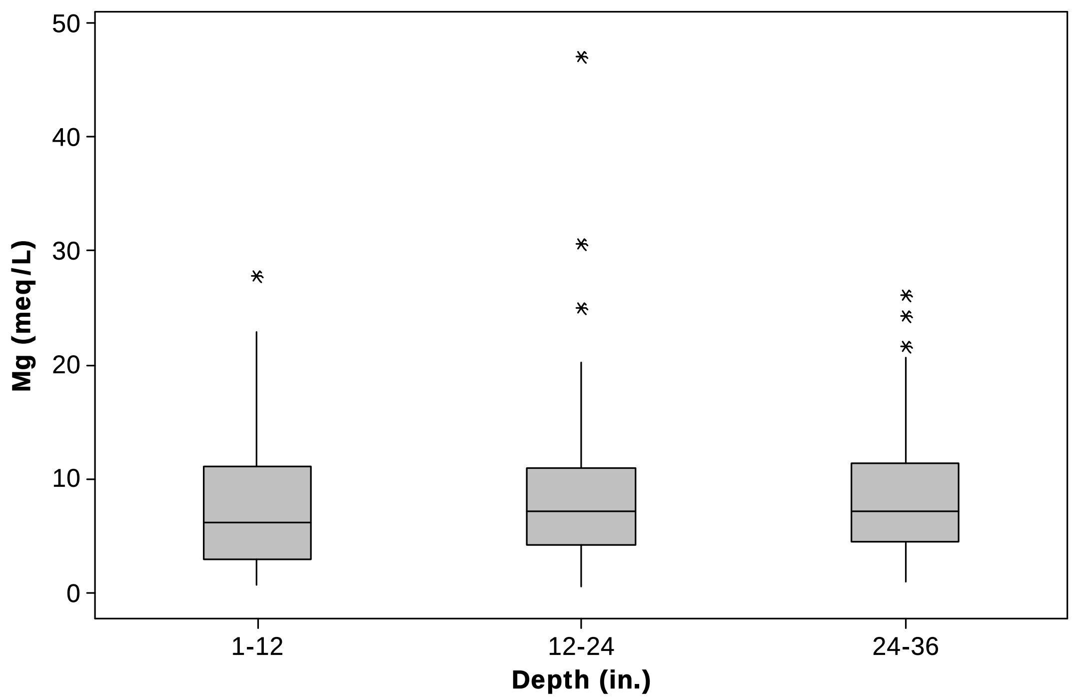




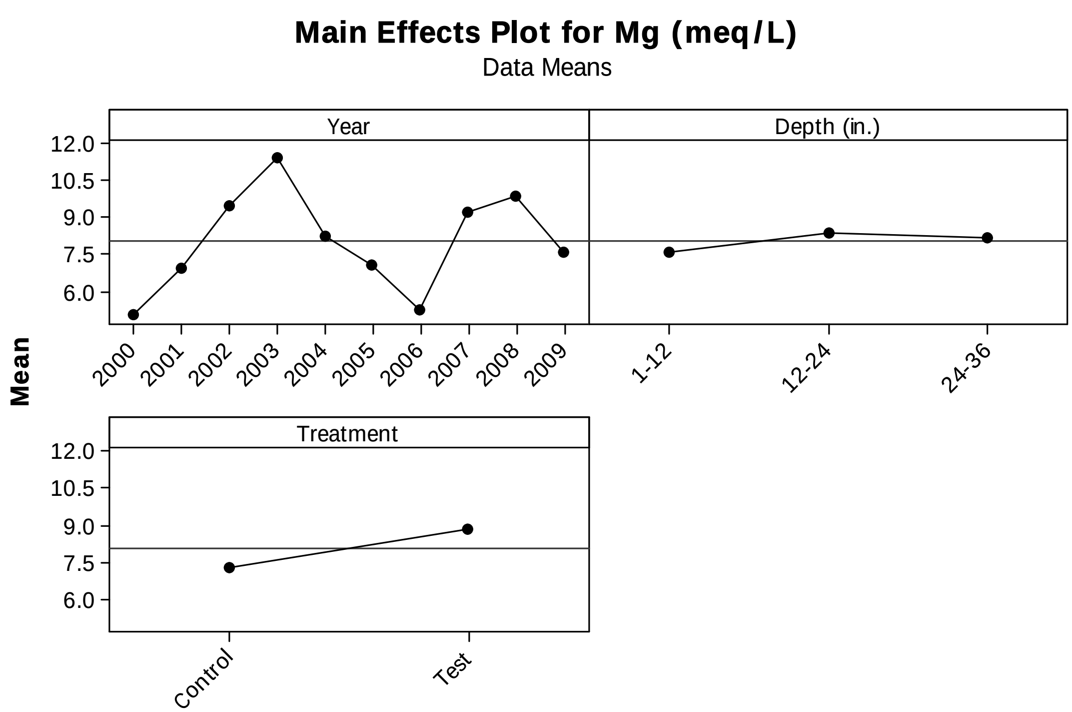
50
40
30
20
10
0
Mg (meq/L)
Treatment
Control
Test
Control
Test
Control
Test
Site
1
3
4



50
40
30
20
10
0
Mg (meq/L)
Control
Test
Treatment



50
40
30
20
10
0
Mg (meq/L)
1-12
12-24
24-36
Depth (in.)



Main Effects Plot for Mg (meq/L)
Data Means
Year
Depth (in.)
12.0
10.5
9.0
7.5
6.0
Mean
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
1-12
12-24
24-36
Treatment
Control
Test

Descriptive Statistics: Cl (meq/L)

Results for Site = 1

Variable	Treatment	N	Mean	SE Mean	StDev	Minimum	Maximum
Cl (meq/L)	Control	90	11.12	1.06	10.06	0.70	38.90
	Test	87	10.732	0.664	6.196	1.600	31.100

Results for Site = 3

Variable	Treatment	N	Mean	SE Mean	StDev	Minimum	Maximum
Cl (meq/L)	Control	90	2.667	0.155	1.468	0.000	6.900
	Test	84	8.718	0.548	5.020	1.000	25.800

Results for Site = 4

Variable	Treatment	N	Mean	SE Mean	StDev	Minimum	Maximum
Cl (meq/L)	Control	87	13.58	1.05	9.81	1.40	35.70
	Test	87	4.926	0.299	2.790	0.800	13.600

Descriptive Statistics: Cl (meq/L)

Results for Treatment = Control

Variable	Year	N	Mean	SE Mean	StDev	Minimum	Maximum
Cl (meq/L)	2000	27	1.911	0.184	0.958	0.700	4.400
	2001	27	1.778	0.140	0.727	0.500	3.600
	2002	27	3.411	0.253	1.314	1.500	6.100
	2003	27	9.09	1.82	9.46	0.00	32.50
	2004	27	10.38	1.56	8.10	1.00	27.20
	2005	27	10.60	1.70	8.83	0.20	30.90
	2006	27	11.38	1.63	8.49	0.50	31.50
	2007	27	13.70	1.88	9.77	1.10	31.70
	2008	27	16.74	2.33	12.09	0.90	38.90
	2009	24	12.09	2.21	10.85	1.50	37.30

Results for Treatment = Test

Variable	Year	N	Mean	SE Mean	StDev	Minimum	Maximum
Cl (meq/L)	2000	27	2.611	0.251	1.306	1.000	6.800
	2001	27	2.948	0.248	1.290	0.800	5.700
	2002	27	5.119	0.536	2.785	1.800	13.500
	2003	27	9.544	0.802	4.169	2.900	18.400
	2004	27	9.367	0.907	4.714	3.300	18.300
	2005	21	9.738	0.983	4.503	3.400	18.400
	2006	21	9.776	0.911	4.173	3.300	17.900
	2007	27	11.27	1.05	5.46	3.30	22.10
	2008	27	11.12	1.28	6.63	2.30	31.10
	2009	27	10.42	1.15	6.00	2.80	25.80

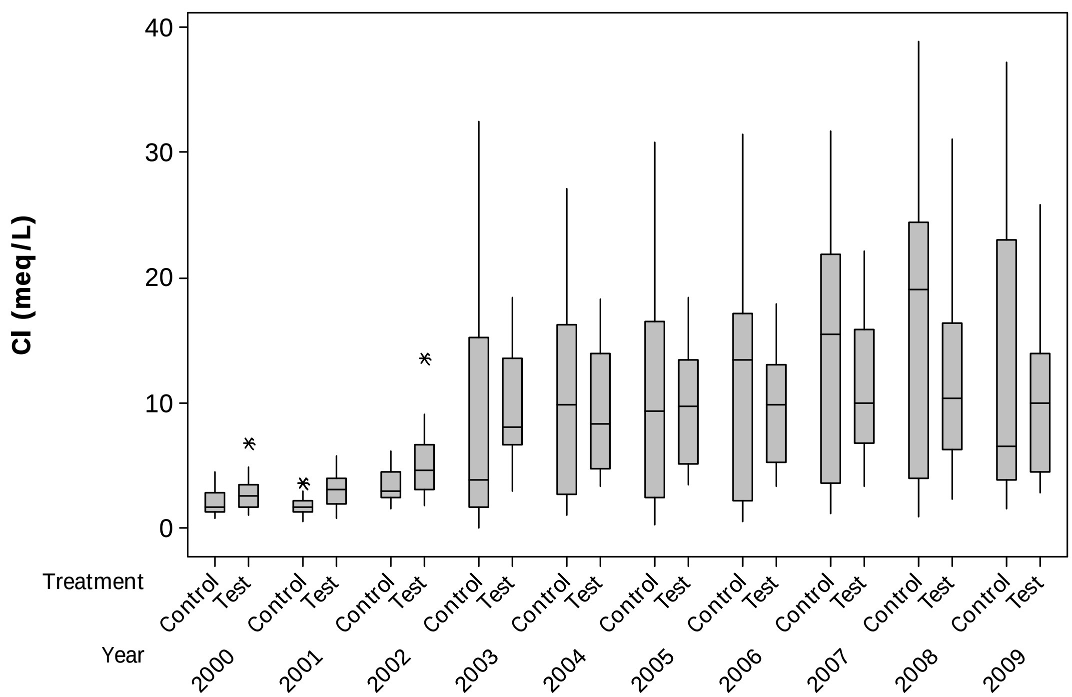
Descriptive Statistics: Cl (meq/L)

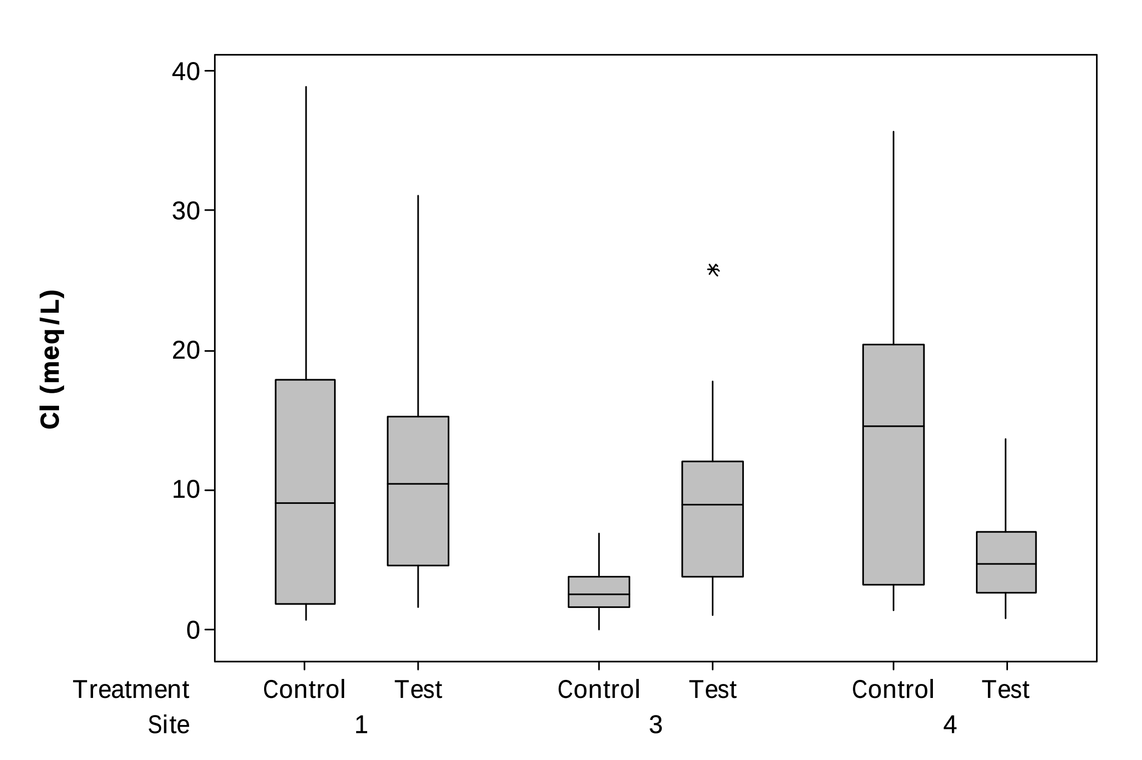
Results for Treatment = Control

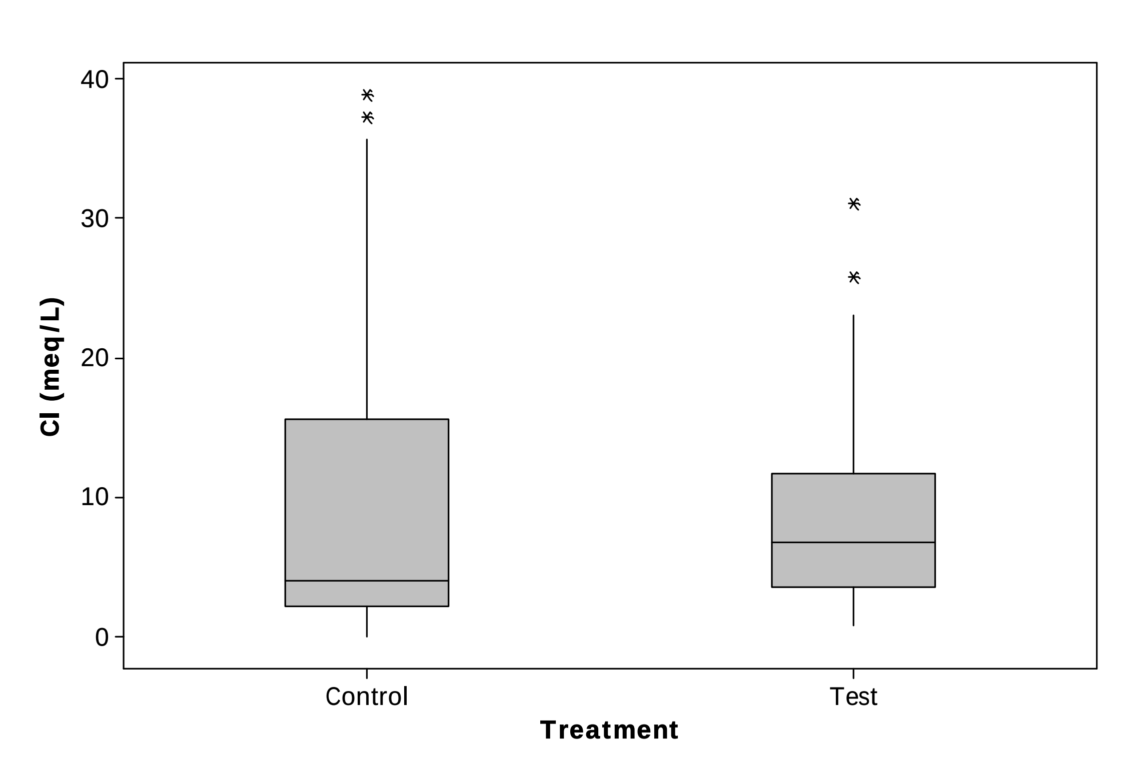
Variable	Depth (in.)	N	Mean	SE Mean	StDev	Minimum	Maximum
Cl (meq/L)	1-12	89	7.709	0.902	8.511	0.200	35.700
	12-24	89	9.53	1.06	10.04	0.00	38.90
	24-36	89	9.98	1.00	9.43	0.60	37.30

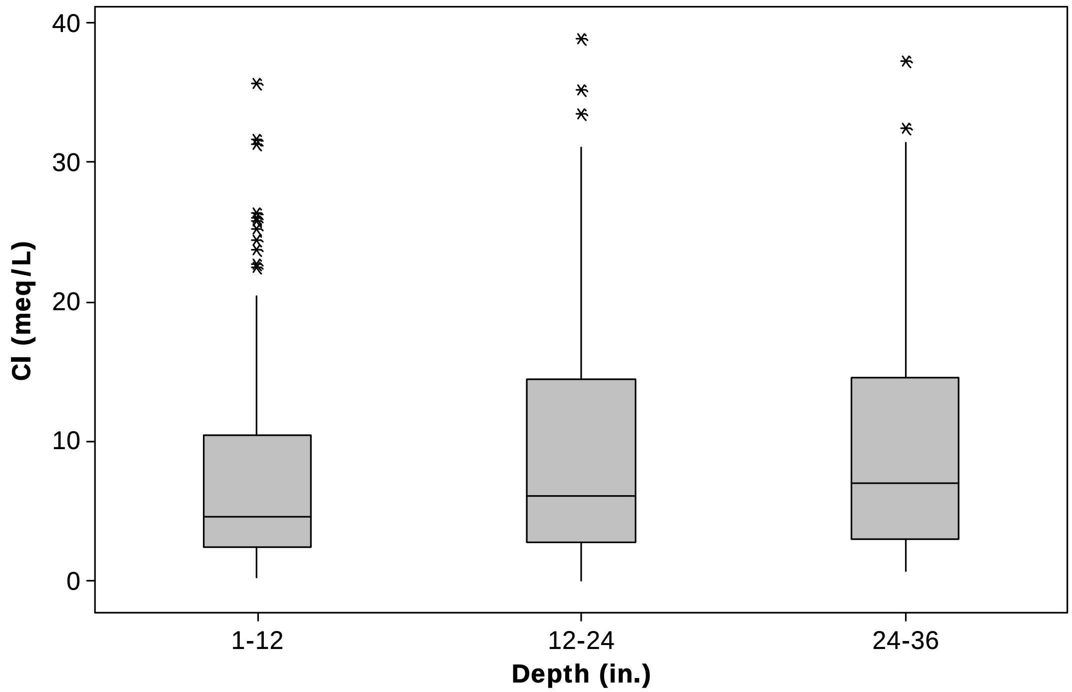
Results for Treatment = Test

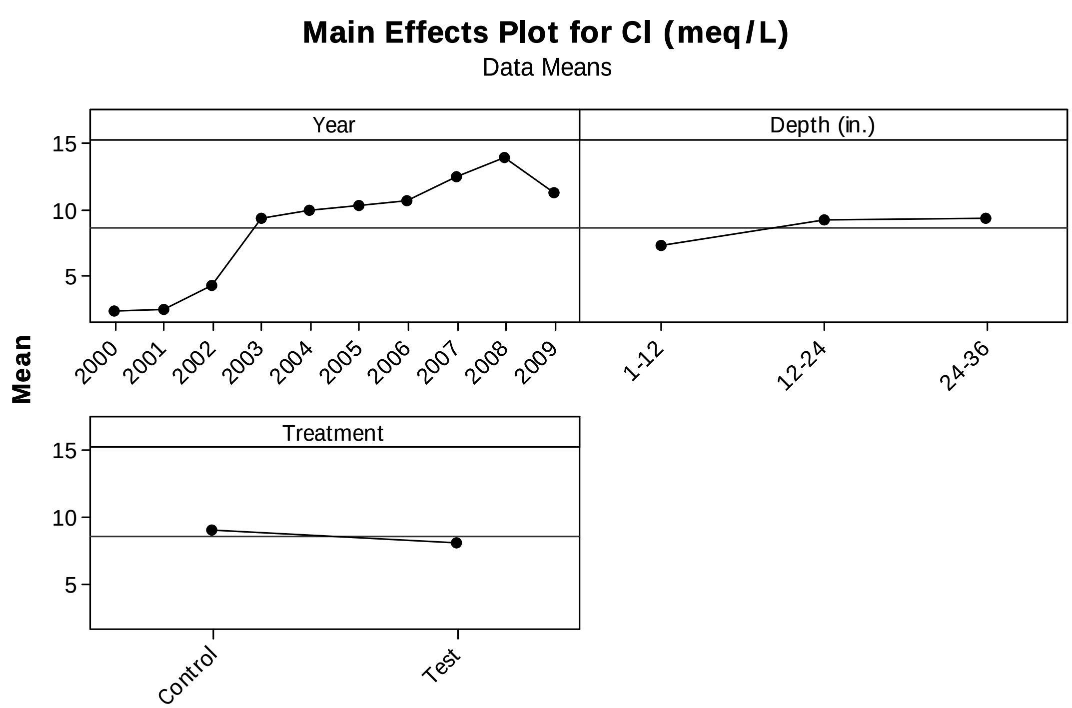
Variable	Depth (in.)	N	Mean	SE Mean	StDev	Minimum	Maximum
Cl (meq/L)	1-12	86	6.817	0.524	4.859	0.900	25.800
	12-24	86	8.880	0.644	5.975	0.800	31.100
	24-36	86	8.658	0.562	5.214	1.100	23.100




Cl (meq/L)
40
30
20
10
0
Treatment
Control
Test
Control
Test
Control
Test
Site
1
3
4


Cl (meq/L)
40
30
20
10
0
Control
Test
Treatment


40
30
20
10
0
Cl (meq/L)
1-12
12-24
24-36
Depth (in.)


Main Effects Plot for Cl (meq/L)
Data Means
Year
Depth (in.)
Treatment
Mean
15
10
5
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
1-12
12-24
24-36
Control
Test

E.2: Statistical Analysis of Na^+ in Irrigation Water

Na in Irrigation Water

General Linear Model: Na (mg/L) versus Year, Site, Treatment

Factor	Type	Levels	Values
Year	fixed	9	2001, 2002, 2003, 2004, 2005, 2006, 2007, 2008, 2009
Site	fixed	3	1, 3, 4
Treatment	fixed	2	Control, Test

Analysis of Variance for Na (mg/L), using Adjusted SS for Tests

Source	DF	Seq SS	Adj SS	Adj MS	F	P
Year	8	84095	92383	11548	8.90	0.000
Site	2	44597	77650	38825	29.92	0.000
Treatment	1	348435	348435	348435	268.54	0.000
Error	738	957576	957576	1298		
Total	749	1434704				

S = 36.0212   R-Sq = 33.26%   R-Sq(adj) = 32.26%

Unusual Observations for Na (mg/L)

Obs	Na (mg/L)	Fit	SE Fit	Residual	St Resid	
135	178.000	106.189	4.818	71.811	2.01	R
138	178.000	106.189	4.818	71.811	2.01	R
139	182.000	106.189	4.818	75.811	2.12	R
142	163.000	91.503	4.704	71.497	2.00	R
159	176.000	98.305	4.861	77.695	2.18	R
168	200.000	98.305	4.861	101.695	2.85	R
381	47.000	122.385	3.942	-75.385	-2.11	R
422	55.000	141.232	4.016	-86.232	-2.41	R
432	64.000	141.232	4.016	-77.232	-2.16	R
435	66.000	141.232	4.016	-75.232	-2.10	R
438	231.000	141.232	4.016	89.768	2.51	R
456	69.000	147.540	4.214	-78.540	-2.20	R
468	69.000	147.540	4.214	-78.540	-2.20	R
483	63.000	135.973	5.015	-72.973	-2.05	R
494	63.000	149.841	4.788	-86.841	-2.43	R
495	61.000	149.841	4.788	-88.841	-2.49	R
496	60.000	149.841	4.788	-89.841	-2.52	R
498	71.000	149.841	4.788	-78.841	-2.21	R
500	77.000	149.841	4.788	-72.841	-2.04	R
502	73.000	149.841	4.788	-76.841	-2.15	R
508	58.000	135.156	4.660	-77.156	-2.16	R
515	58.000	135.156	4.660	-77.156	-2.16	R
519	48.000	141.957	4.834	-93.957	-2.63	R
521	46.000	141.957	4.834	-95.957	-2.69	R
525	61.000	141.957	4.834	-80.957	-2.27	R
527	64.000	141.957	4.834	-77.957	-2.18	R
532	52.000	141.957	4.834	-89.957	-2.52	R
705	211.000	117.548	4.849	93.452	2.62	R
745	47.000	118.273	5.319	-71.273	-2.00	R

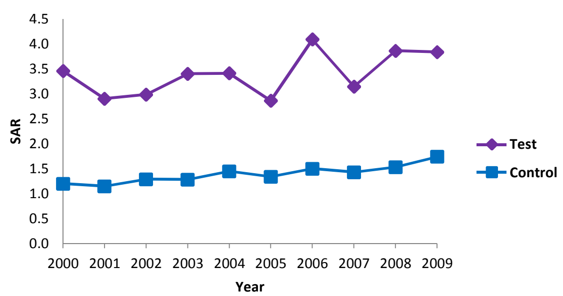
R denotes an observation with a large standardized residual.

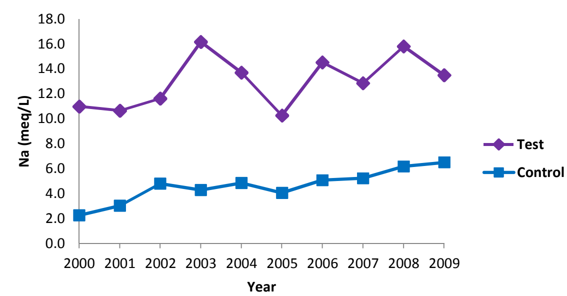
Appendix F: Soil Salinity Graphs at Different Locations and Depths

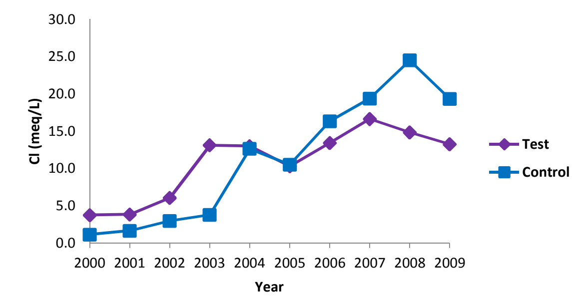
Site 1: Soil Profile 1-36"

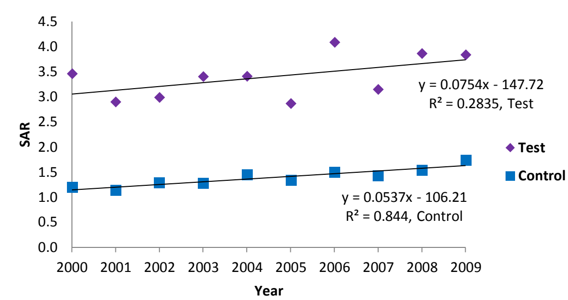
	ECe 1-36"		Ca 1-36"		Mg 1-36"		Na 1-36"		Cl 1-36"		SAR 1-36"		ESP 1-36"	
	Control	Test	Control	Test	Control	Test	Control	Test	Control	Test	Control	Test	Control	Test
2000	0.98	3.21	4.11	9.97	3.19	10.54	2.27	10.98	1.17	3.74	1.20	3.46	0.50	3.70
2001	1.85	3.92	9.04	14.59	6.14	13.29	3.03	10.64	1.64	3.86	1.15	2.90	0.43	2.93
2002	3.38	4.28	16.31	15.14	12.30	15.57	4.80	11.62	3.00	6.06	1.29	2.99	0.63	3.05
2003	2.59	5.83	12.03	22.71	9.69	23.19	4.29	16.16	3.79	13.10	1.28	3.40	0.62	3.62
2004	2.88	3.92	14.37	16.46	10.75	15.93	4.84	13.69	12.63	13.00	1.45	3.41	0.86	3.63
2005	2.23	3.39	11.39	13.31	7.38	11.92	4.06	10.27	10.50	10.29	1.34	2.86	0.71	2.87
2006	2.78	3.90	15.58	15.92	7.48	9.37	5.08	14.52	16.33	13.43	1.50	4.09	0.95	4.55
2007	2.97	4.30	16.13	16.79	10.99	15.17	5.22	12.86	19.37	16.64	1.43	3.15	0.84	3.26
2008	3.92	4.75	19.92	17.19	12.96	15.99	6.19	15.80	24.48	14.84	1.53	3.86	0.99	4.24
2009	3.52	3.29	18.20	12.78	11.64	11.63	6.50	13.50	19.31	13.26	1.74	3.84	1.29	4.21
	0.34286167		0.36918863		0.46012119		0.60426719		0.83545217		0.68172101		0.68037126	

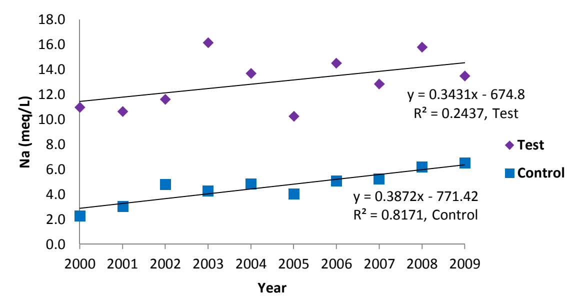
NOTE: Using Control and Test Site 1

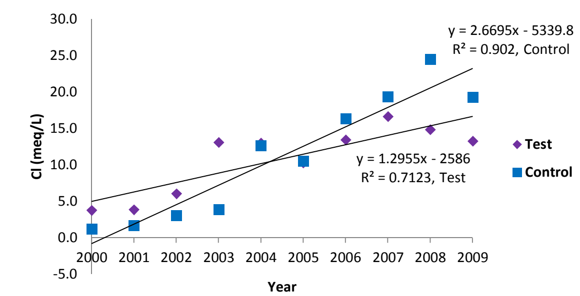


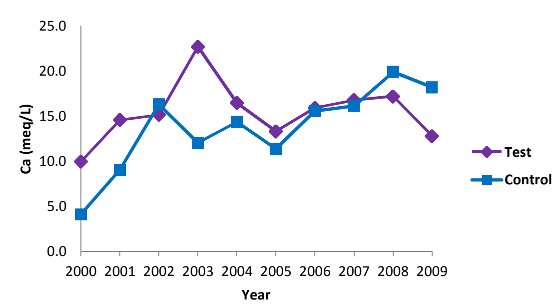


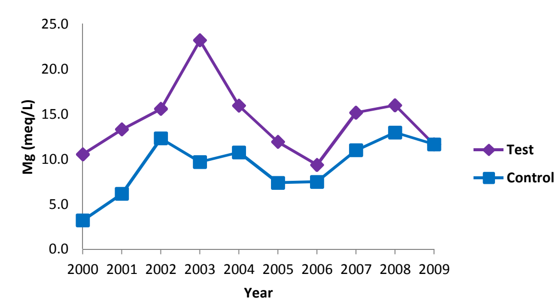


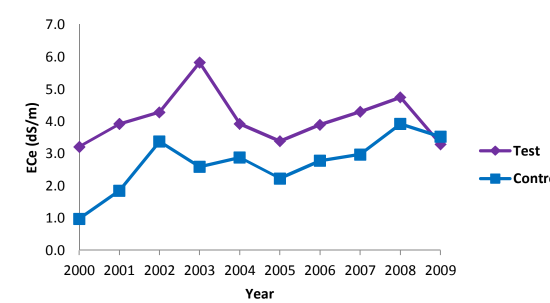


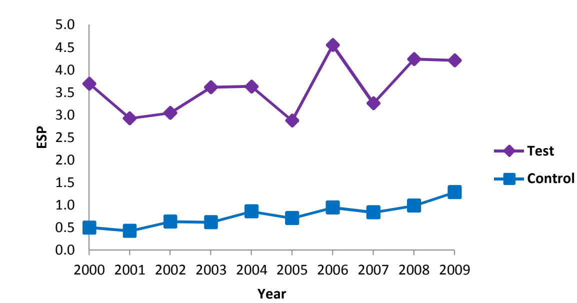


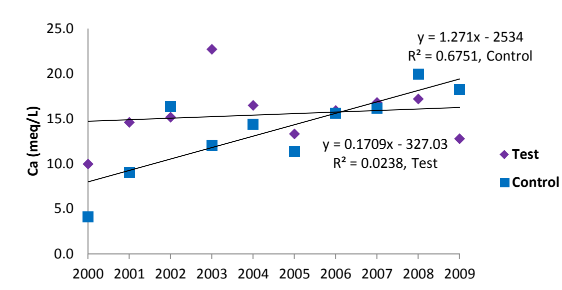


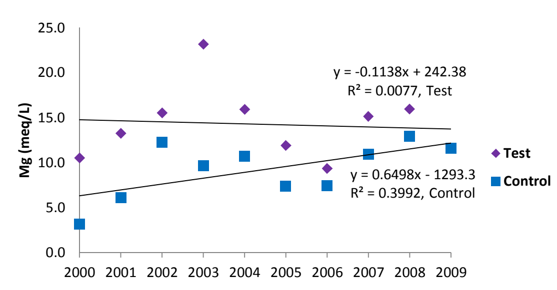


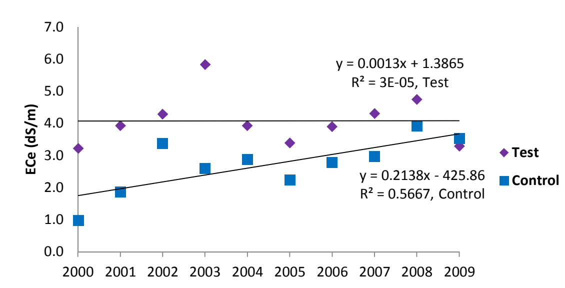


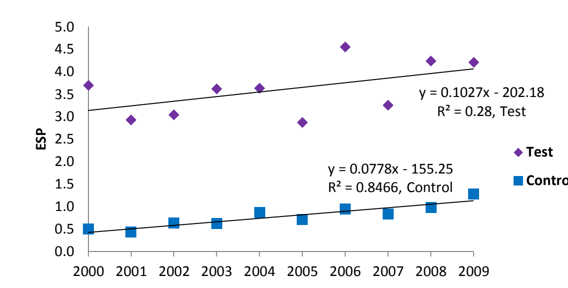








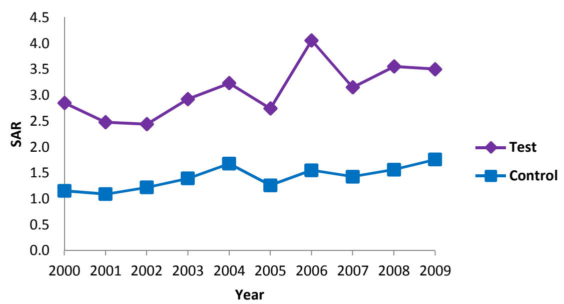


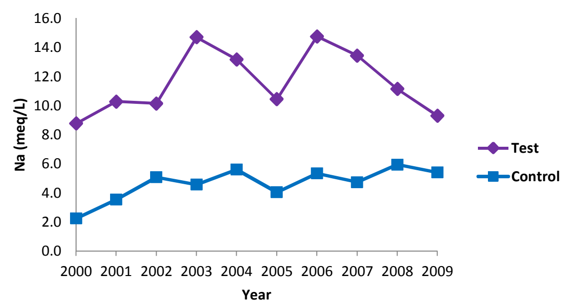


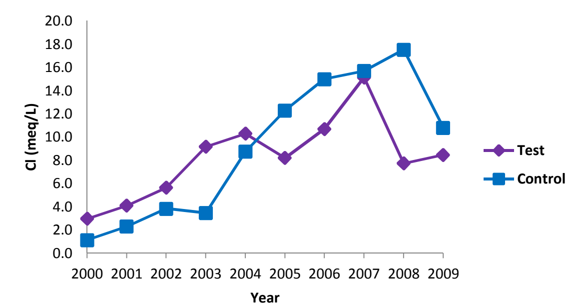
Site 1: Soil Profile 1-12"

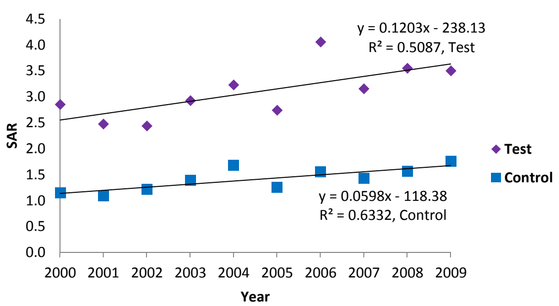
	ECe 1-12"		Ca 1-12"		Mg 1-12"		Na 1-12"		Cl 1-12"		SAR 1-12"		ESP 1-12"	
	Control	Test	Control	Test	Control	Test	Control	Test	Control	Test	Control	Test	Control	Test
2000	1.01	2.90	4.37	10.97	3.20	8.87	2.23	8.77	1.13	2.97	1.15	2.85	0.43	2.86
2001	2.65	4.57	13.97	19.73	8.50	14.80	3.53	10.27	2.30	4.10	1.09	2.47	0.35	2.33
2002	4.13	4.52	21.10	19.13	14.53	15.23	5.07	10.13	3.83	5.63	1.22	2.44	0.53	2.28
2003	2.41	6.21	11.83	27.27	8.50	23.67	4.57	14.70	3.47	9.17	1.39	2.93	0.78	2.96
2004	3.57	3.93	18.30	18.40	11.85	14.77	5.60	13.17	8.75	10.30	1.68	3.23	1.19	3.39
2005	2.49	3.70	13.57	16.47	7.67	11.87	4.03	10.43	12.30	8.20	1.26	2.74	0.59	2.70
2006	2.93	4.08	17.27	17.95	6.87	8.75	5.33	14.75	15.00	10.70	1.55	4.06	1.02	4.51
2007	2.53	4.68	14.43	19.70	8.23	15.50	4.73	13.43	15.70	15.13	1.42	3.15	0.83	3.27
2008	3.48	3.05	18.73	11.63	10.37	8.63	5.93	11.13	17.53	7.73	1.56	3.55	1.03	3.82
2009	2.69	2.26	15.27	8.67	7.47	5.23	5.40	9.30	10.80	8.47	1.76	3.50	1.31	3.76
	0.13204665		0.11342074		0.34198197		0.43349115		0.69869447		0.79154995		0.79815406	

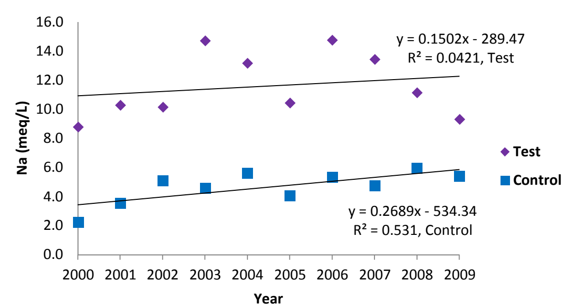
NOTE: Using Control and Test Site 1

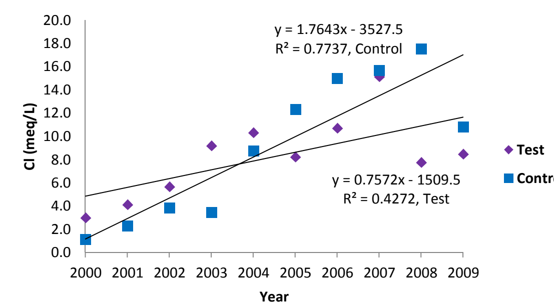


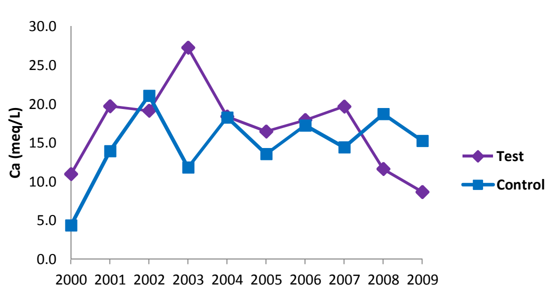


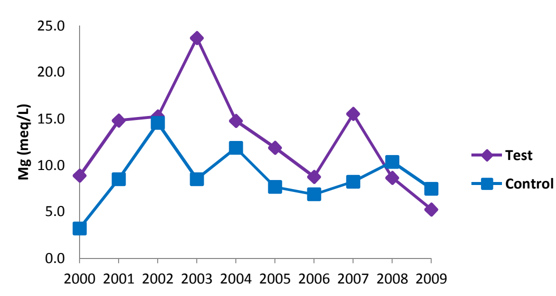


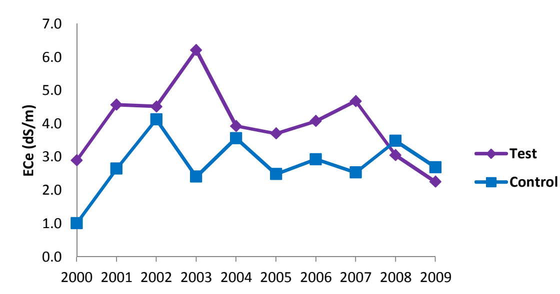


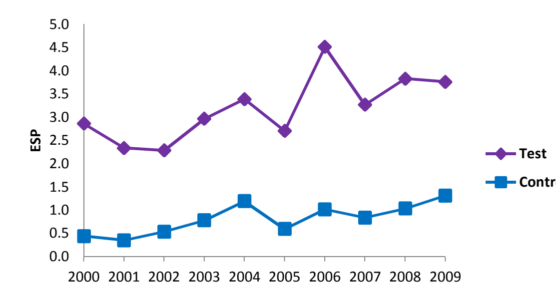


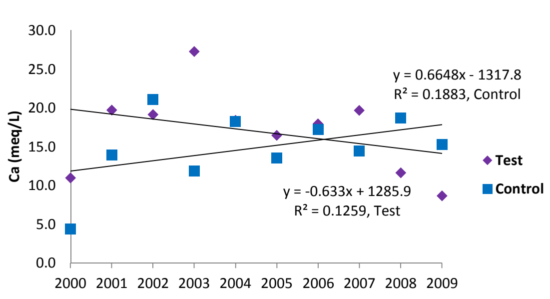


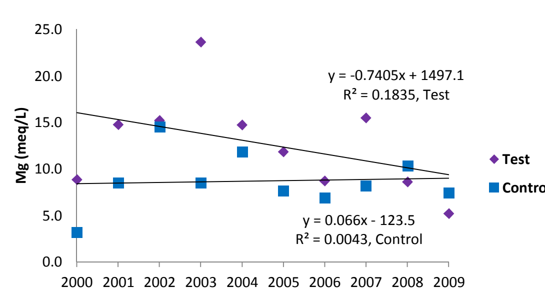


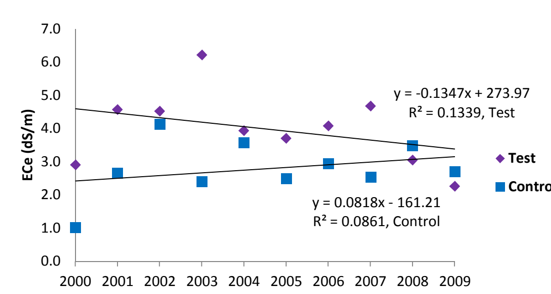


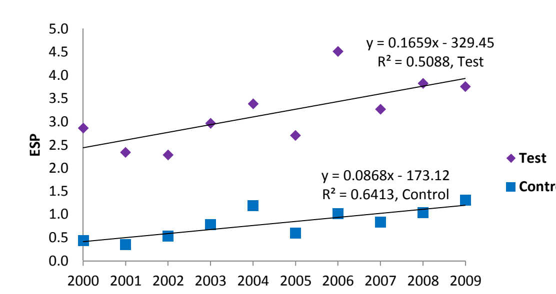








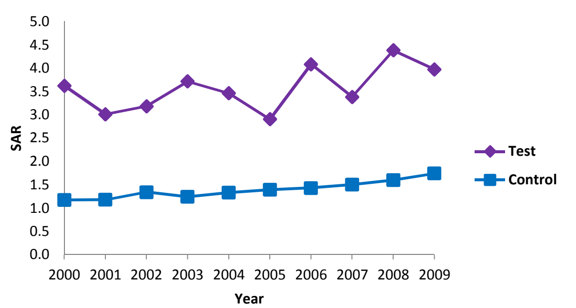


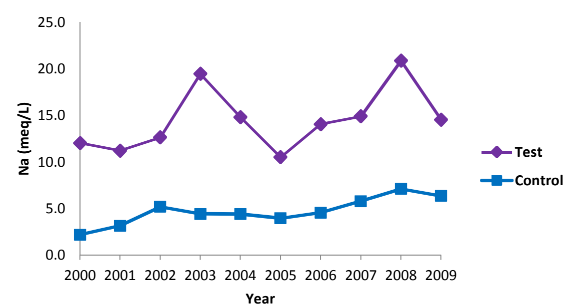


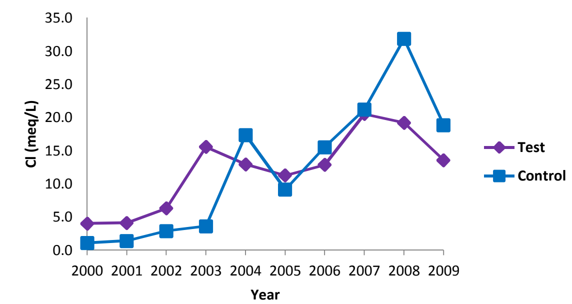
Site 1: Soil Profile 12-24"

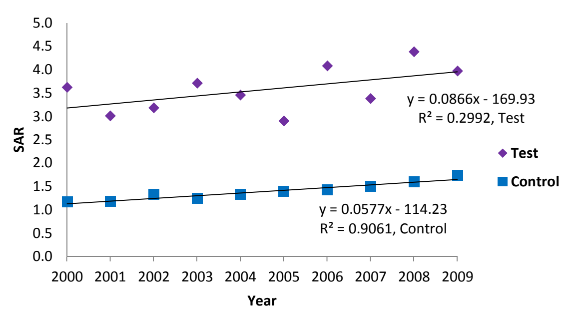
	ECe 12-24"		Ca 12-24"		Mg 12-24"		Na 12-24"		Cl 12-24"		SAR 12-24"		ESP 12-24"	
	Control	Test	Control	Test	Control	Test	Control	Test	Control	Test	Control	Test	Control	Test
2000	0.96	3.54	4.03	10.73	3.13	11.70	2.17	12.03	1.10	4.00	1.17	3.62	0.46	3.92
2001	1.80	3.96	8.40	14.27	6.10	13.50	3.13	11.20	1.40	4.10	1.17	3.01	0.47	3.08
2002	3.54	4.48	17.07	15.13	12.83	16.50	5.17	12.63	2.90	6.30	1.33	3.18	0.70	3.31
2003	2.92	6.74	13.30	26.53	11.23	28.00	4.40	19.47	3.63	15.57	1.24	3.71	0.56	4.04
2004	2.52	4.29	12.30	18.50	9.48	18.13	4.38	14.80	17.38	12.93	1.33	3.46	0.69	3.70
2005	1.99	3.42	9.70	13.90	6.70	10.50	3.93	10.50	9.13	11.27	1.39	2.90	0.78	2.92
2006	2.48	3.75	13.17	15.70	7.23	8.00	4.53	14.05	15.53	12.85	1.43	4.08	0.84	4.54
2007	3.27	4.87	18.37	19.13	11.37	17.47	5.77	14.90	21.20	20.53	1.50	3.38	0.94	3.57
2008	4.68	6.28	24.23	23.20	15.73	20.80	7.10	20.87	31.87	19.20	1.59	4.38	1.08	4.93
2009	3.16	3.67	16.03	14.40	10.00	11.70	6.33	14.53	18.87	13.57	1.74	3.97	1.29	4.39
	0.64827402		0.59734686		0.62082536		0.62494967		0.81034236		0.53234435		0.52700335	

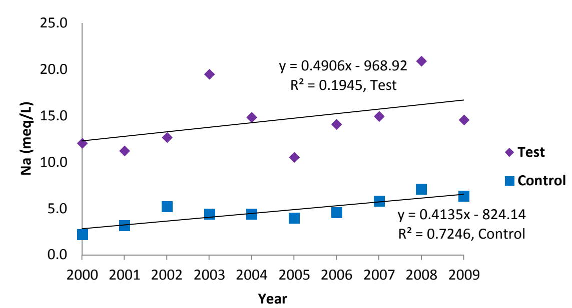
NOTE: Using Control and Test Site 1

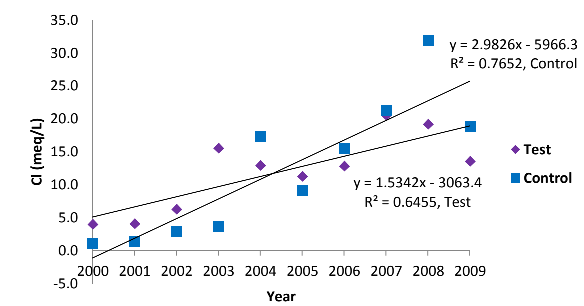


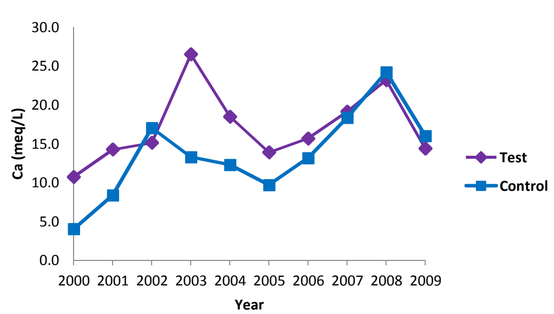


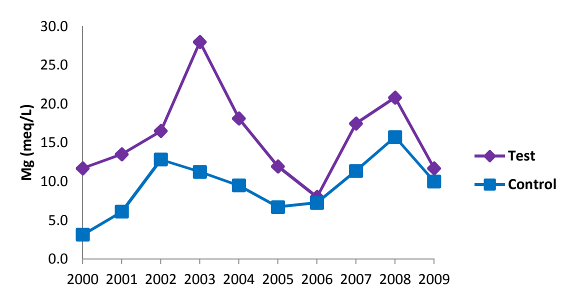


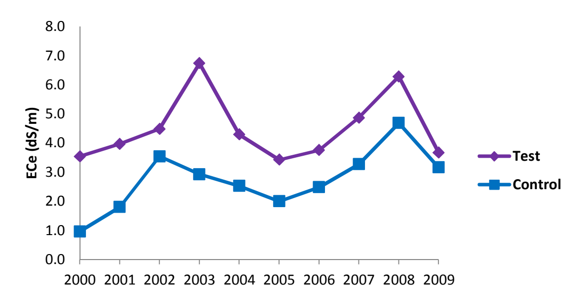


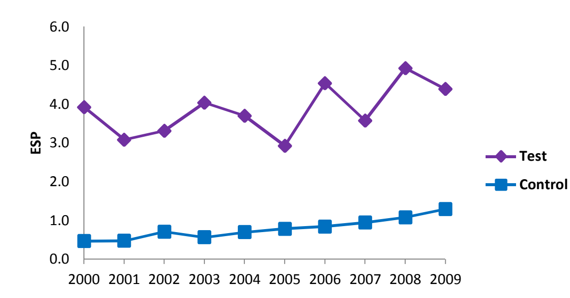


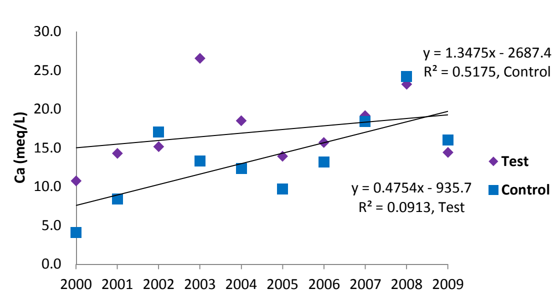


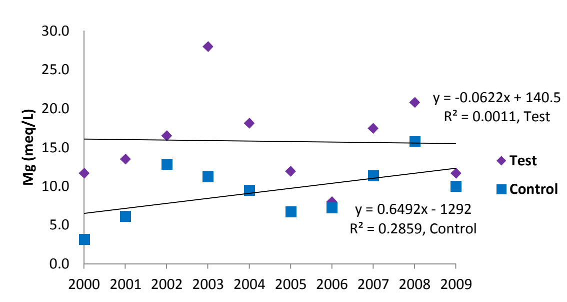


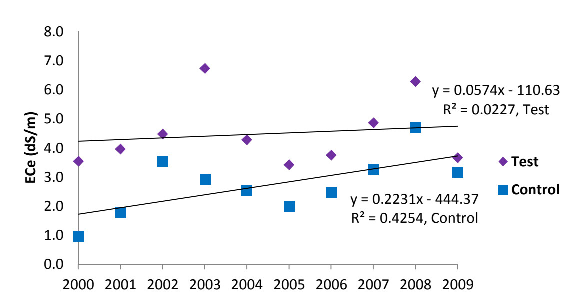


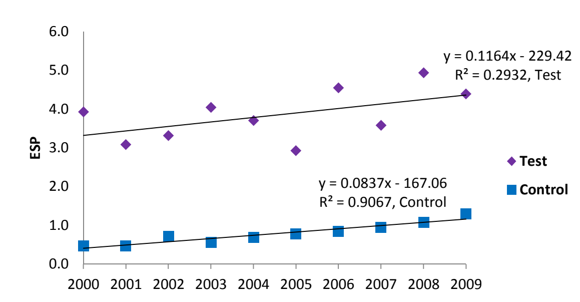








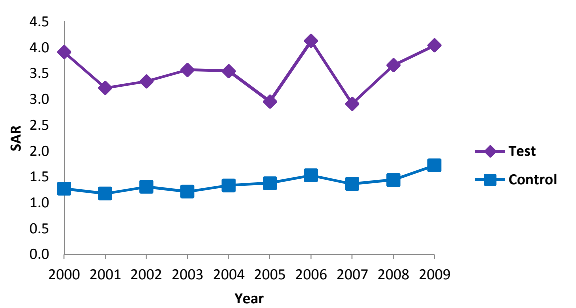


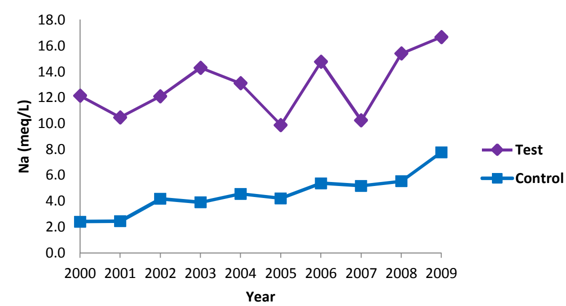


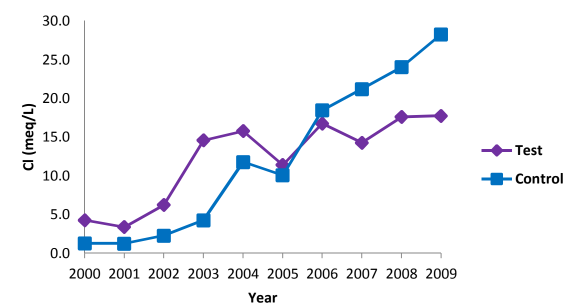
Site 1: Soil Profile 24-36"

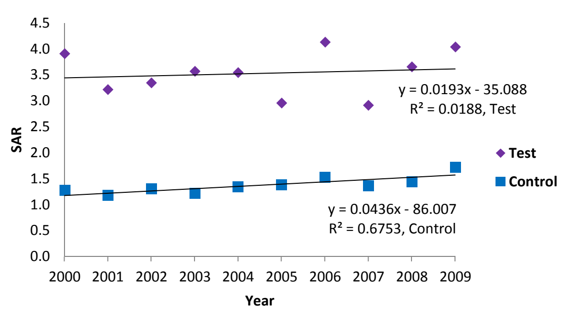
	ECe 24-36"		Ca 24-36"		Mg 24-36"		Na 24-36"		Cl 24-36"		SAR 24-36"		ESP 24-36"	
	Control	Test	Control	Test	Control	Test	Control	Test	Control	Test	Control	Test	Control	Test
2000	0.97	3.20	3.93	8.20	3.23	11.07	2.40	12.13	1.27	4.27	1.27	3.91	0.61	4.31
2001	1.10	3.23	4.77	9.77	3.83	11.57	2.43	10.47	1.23	3.37	1.17	3.22	0.47	3.37
2002	2.46	3.85	10.77	11.17	9.53	14.97	4.17	12.10	2.27	6.23	1.30	3.34	0.66	3.54
2003	2.44	4.54	10.97	14.33	9.33	17.90	3.90	14.30	4.27	14.57	1.21	3.57	0.52	3.85
2004	2.55	3.55	12.50	12.47	10.93	14.90	4.55	13.10	11.78	15.77	1.33	3.54	0.70	3.81
2005	2.21	3.03	10.90	9.57	7.77	11.97	4.20	9.87	10.07	11.40	1.38	2.95	0.77	3.00
2006	2.93	3.87	16.30	14.10	8.33	11.35	5.37	14.75	18.47	16.75	1.53	4.13	0.99	4.61
2007	3.12	3.36	15.60	11.53	13.37	12.53	5.17	10.23	21.20	14.27	1.36	2.91	0.74	2.94
2008	3.59	4.90	16.80	16.73	12.77	18.53	5.53	15.40	24.03	17.60	1.44	3.66	0.85	3.97
2009	4.72	3.95	23.30	15.27	17.47	17.97	7.77	16.67	28.27	17.73	1.72	4.04	1.26	4.49
	0.53547337		0.79181712		0.68942091		0.65638716		0.83335985		0.50839969		0.50290875	

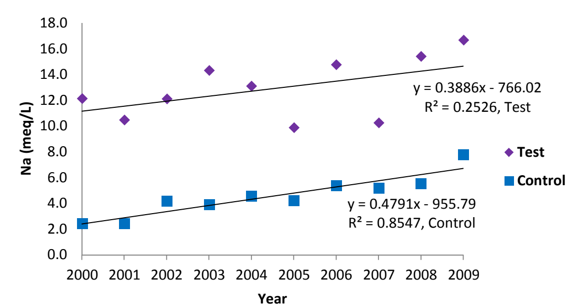
NOTE: Using Control and Test Site 1

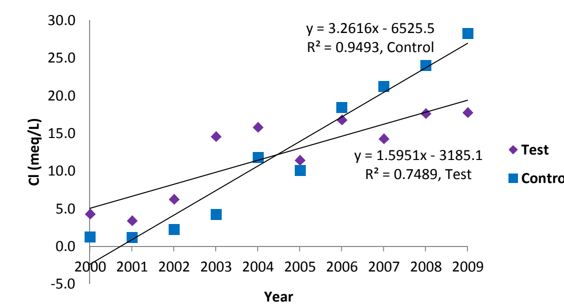


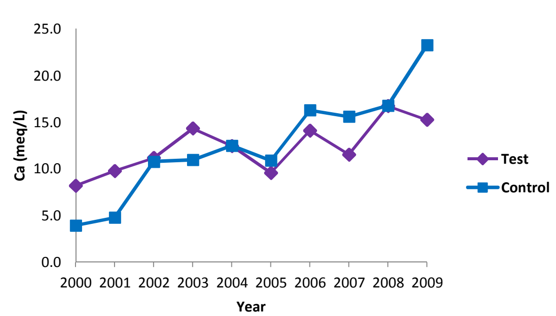


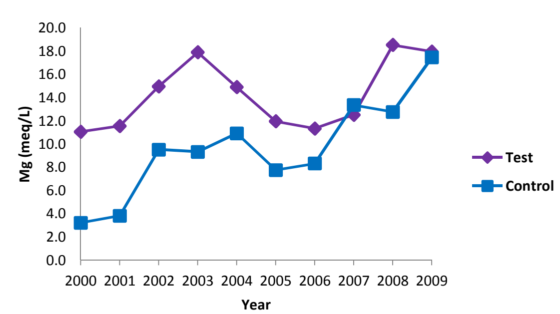


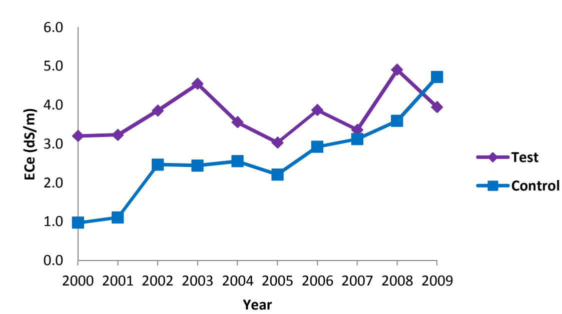


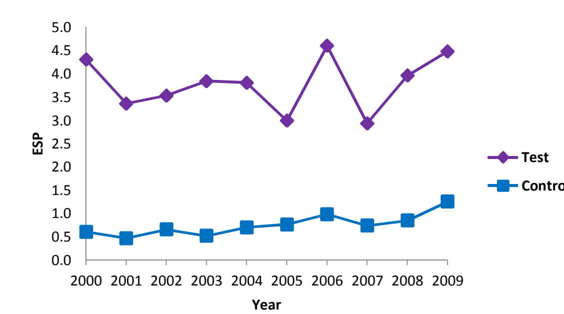


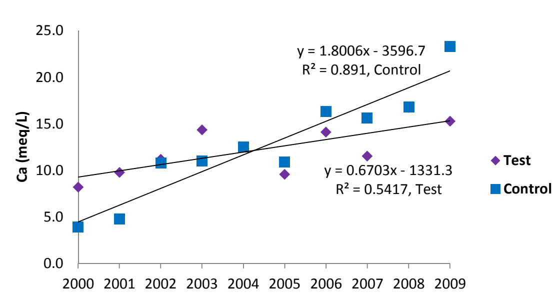


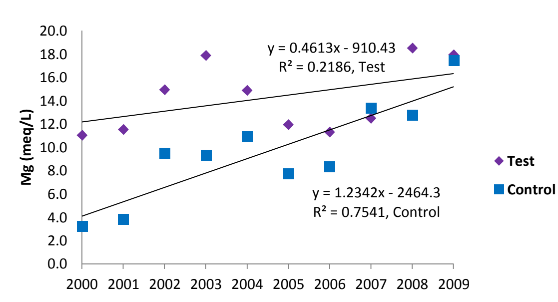


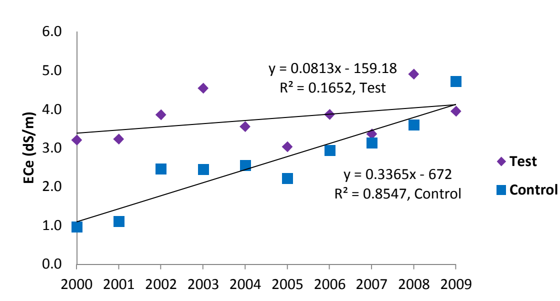


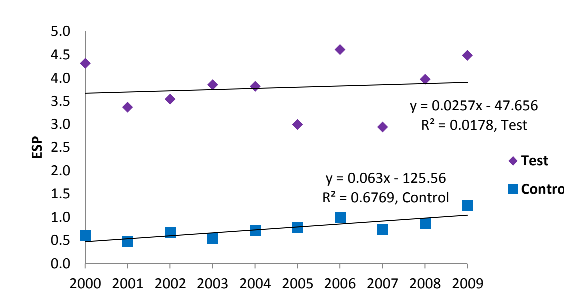








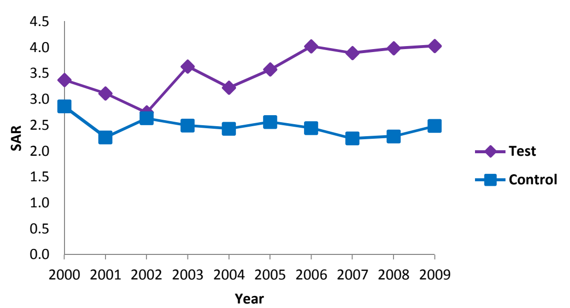


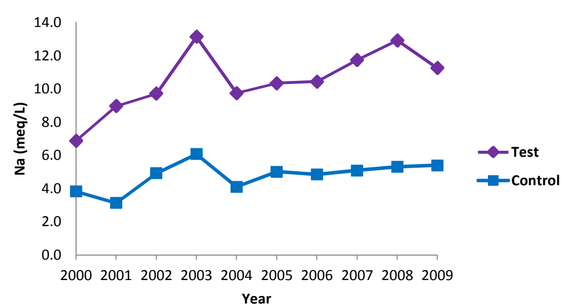


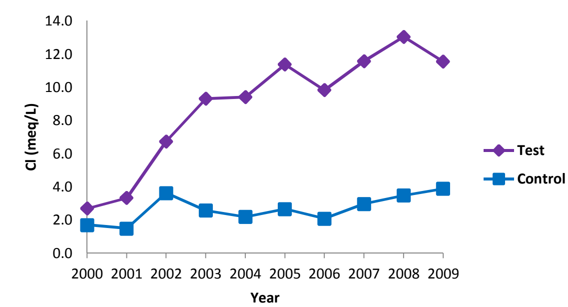
Site 3: Soil Profile 1-36"

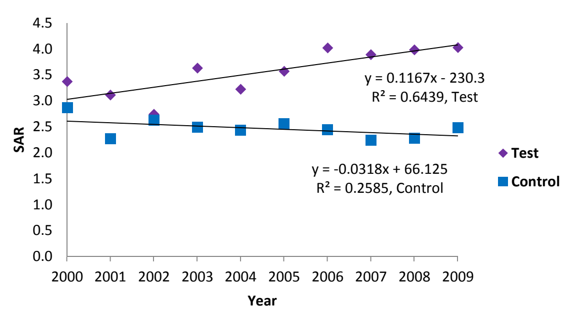
	ECe 1-36"		Ca 1-36"		Mg 1-36"		Na 1-36"		Cl 1-36"		SAR 1-36"		ESP 1-36"	
	Control	Test	Control	Test	Control	Test	Control	Test	Control	Test	Control	Test	Control	Test
2000	0.79	1.93	1.83	7.10	2.07	4.95	3.82	6.87	1.70	2.69	2.86	3.37	2.86	3.51
2001	0.75	3.08	2.10	12.11	2.02	8.88	3.13	8.96	1.49	3.33	2.26	3.11	2.02	3.20
2002	1.51	3.93	5.16	16.47	4.69	13.00	4.92	9.71	3.63	6.73	2.63	2.74	2.54	2.69
2003	2.08	4.20	7.11	15.73	7.12	12.46	6.07	13.13	2.58	9.31	2.49	3.63	2.35	3.90
2004	0.97	2.49	2.77	10.93	3.03	8.01	4.10	9.74	2.19	9.41	2.43	3.22	2.27	3.36
2005	1.27	2.69	3.59	9.68	4.14	7.25	5.00	10.33	2.66	11.37	2.56	3.57	2.44	3.83
2006	1.36	2.41	5.40	9.23	3.30	4.28	4.84	10.43	2.09	9.83	2.44	4.02	2.28	4.45
2007	1.59	2.85	5.88	10.99	5.58	8.22	5.08	11.74	2.97	11.58	2.24	3.89	2.00	4.28
2008	1.61	3.35	5.31	12.32	5.63	9.13	5.30	12.91	3.48	13.04	2.28	3.98	2.06	4.40
2009	1.47	2.77	4.61	10.27	5.21	6.81	5.39	11.24	3.89	11.54	2.48	4.02	2.34	4.46
	0.70475453		0.55913649		0.56508423		0.8232171		0.65136058		-0.3462009		-0.3576748	

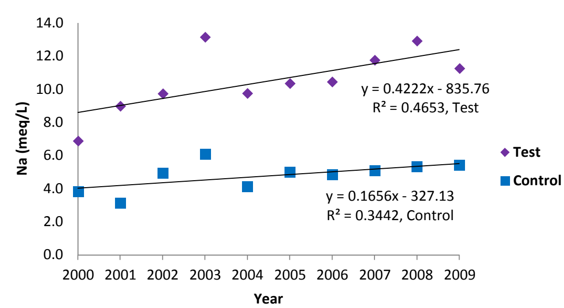
NOTE: Using Control 3 and Test Site 3A

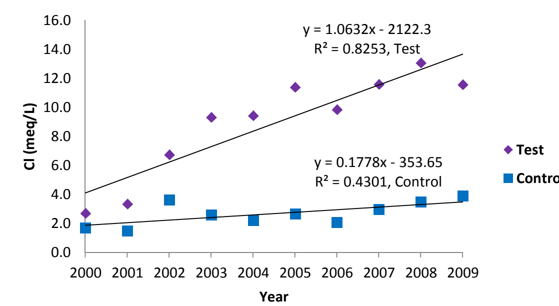


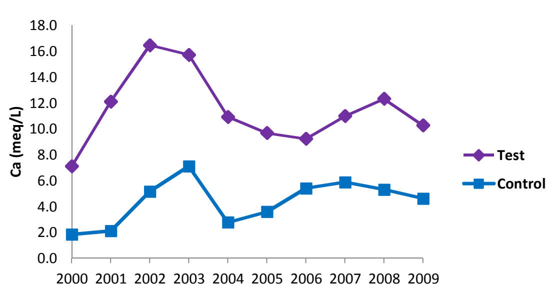


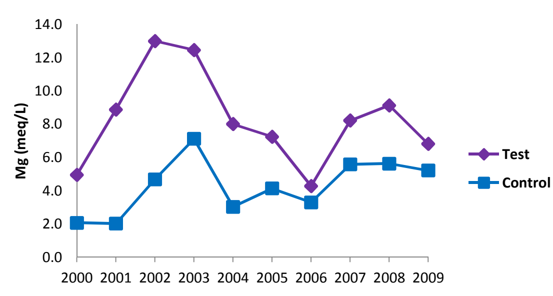


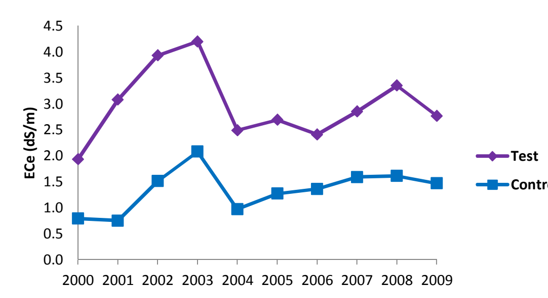


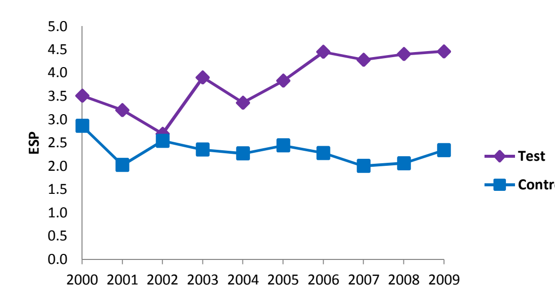


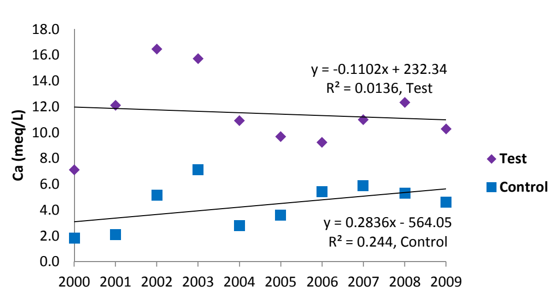


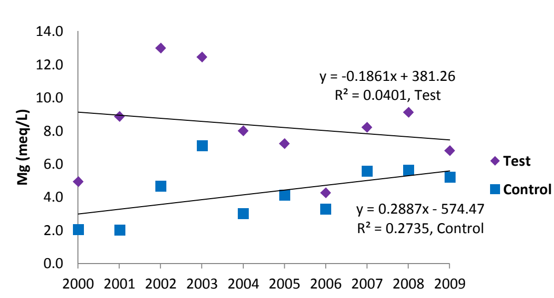


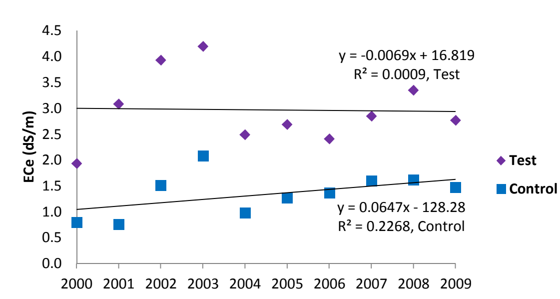


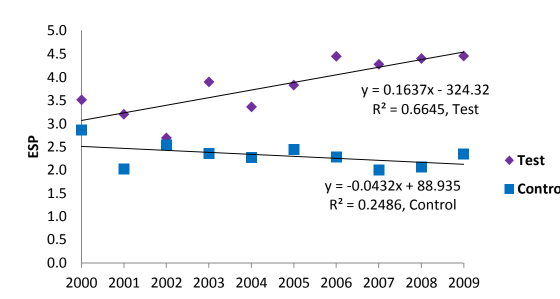








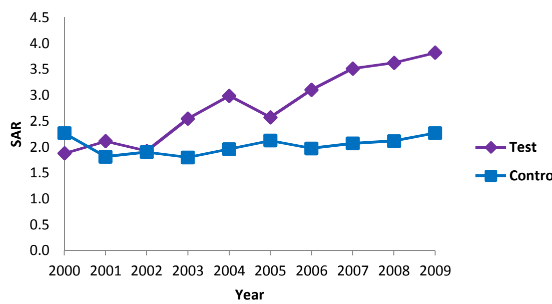


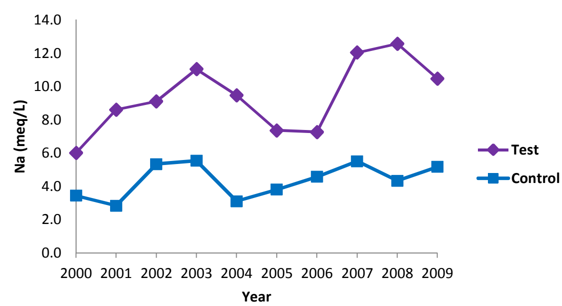


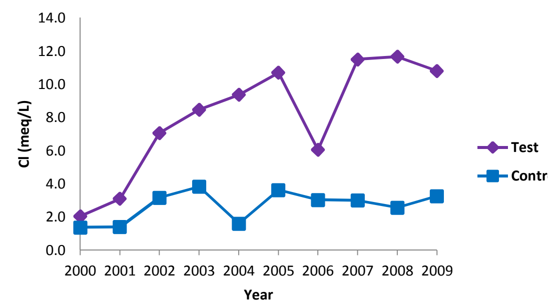
Site 3: Soil Profile 1-12"

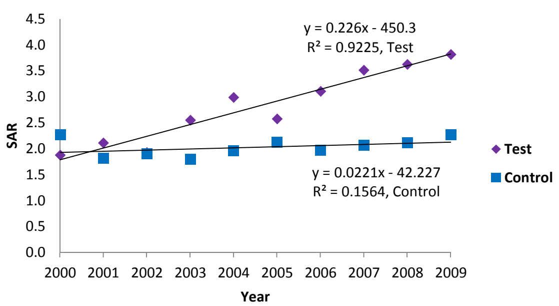
	ECe 1-12"		Ca 1-12"		Mg 1-12"		Na 1-12"		Cl 1-12"		SAR 1-12"		ESP 1-12"	
	Control	Test	Control	Test	Control	Test	Control	Test	Control	Test	Control	Test	Control	Test
2000	0.90	2.69	2.83	12.50	2.47	7.70	3.43	6.00	1.37	2.05	2.27	1.87	2.04	1.48
2001	0.81	4.32	2.63	20.97	2.33	12.67	2.83	8.60	1.40	3.10	1.81	2.11	1.39	1.82
2002	2.50	5.41	9.70	26.97	9.47	18.63	5.33	9.10	3.17	7.07	1.90	1.92	1.52	1.55
2003	2.68	4.97	10.90	22.30	9.13	15.35	5.53	11.03	3.83	8.47	1.80	2.55	1.37	2.43
2004	0.81	2.36	2.80	11.43	2.53	8.67	3.10	9.47	1.60	9.37	1.96	2.99	1.60	3.05
2005	1.03	2.33	4.03	11.35	2.57	4.35	3.80	7.35	3.63	10.70	2.12	2.57	1.83	2.46
2006	1.65	1.86	7.97	8.65	4.00	2.40	4.57	7.25	3.03	6.05	1.97	3.10	1.62	3.21
2007	2.01	3.30	8.87	14.73	7.07	9.03	5.50	12.03	3.00	11.50	2.07	3.51	1.75	3.77
2008	1.28	3.53	4.70	14.70	3.77	9.13	4.33	12.57	2.57	11.67	2.11	3.62	1.82	3.92
2009	1.55	2.82	5.93	12.00	5.30	6.27	5.17	10.47	3.27	10.80	2.27	3.82	2.04	4.19
	0.61417784		0.44779306		0.65881999		0.52359667		0.5939749		0.3592562		0.35360813	

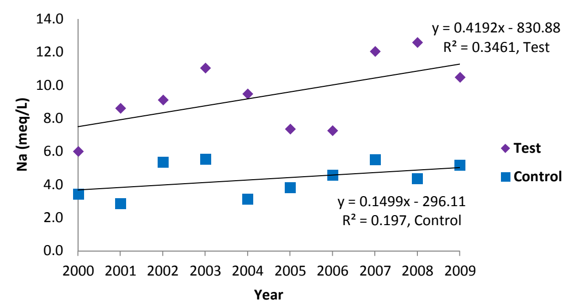
NOTE: Using Control 3 and Test Site 3A

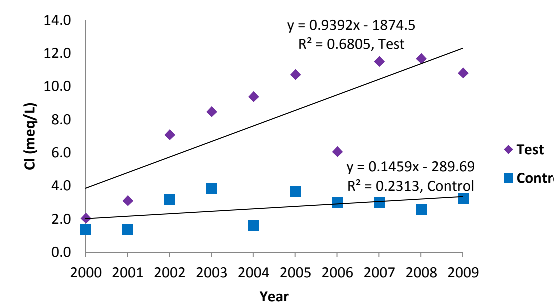


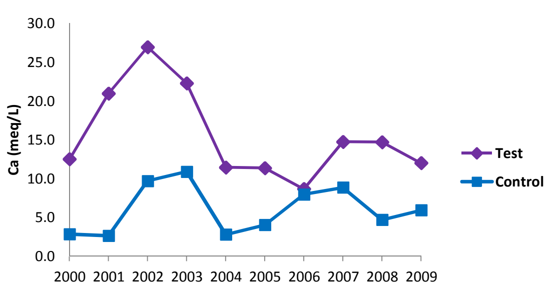


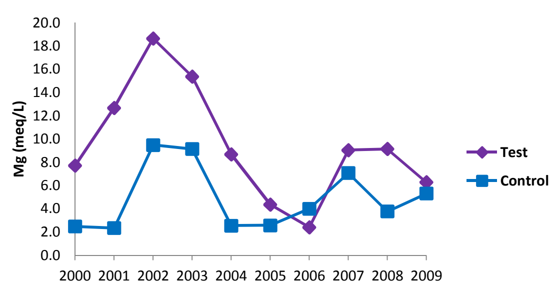


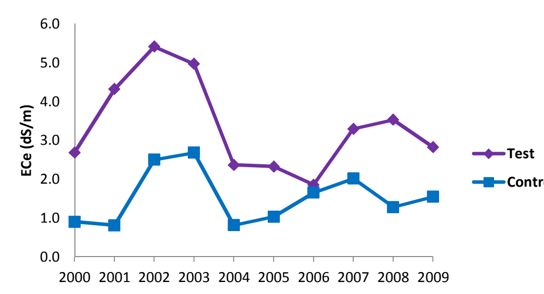


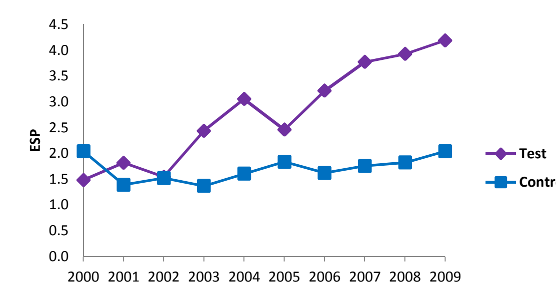


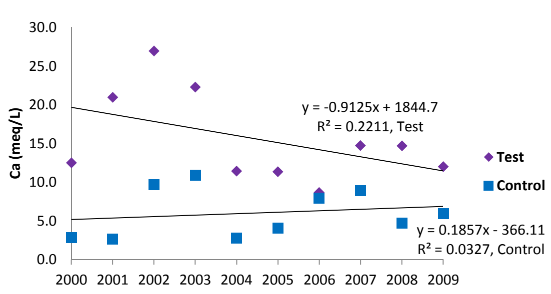


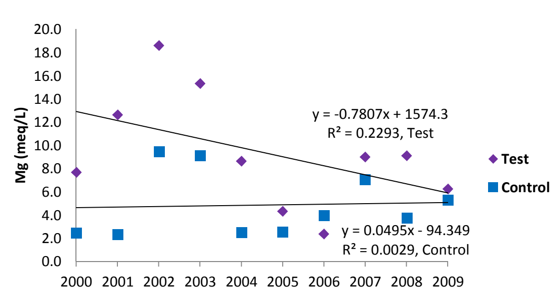


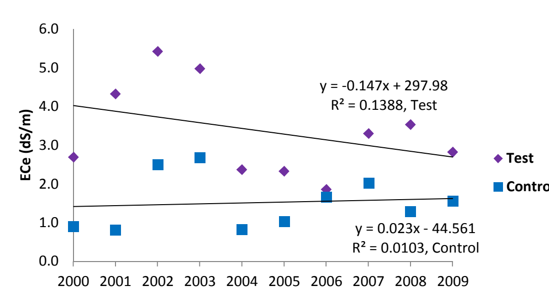


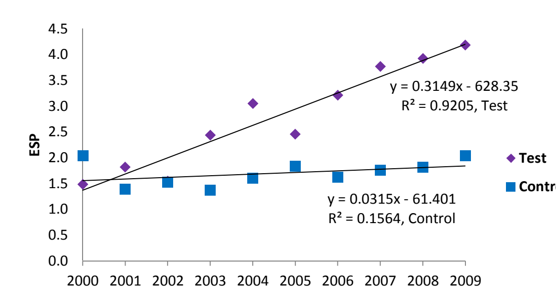








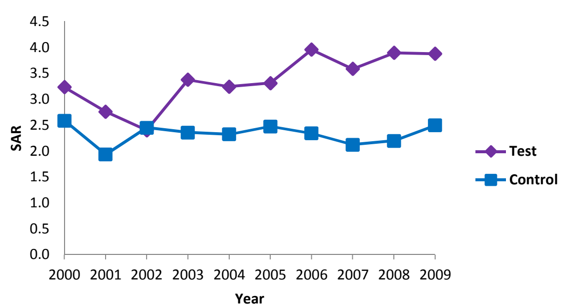


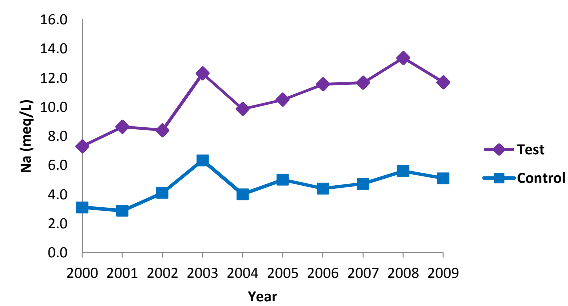


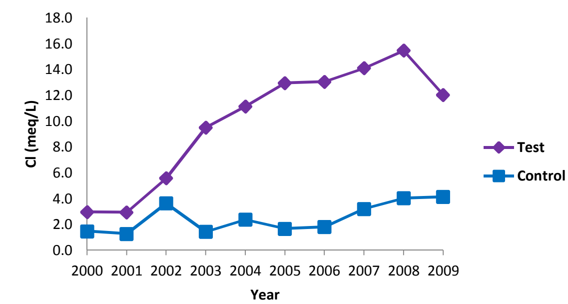
Site 3: Soil Profile 12-24"

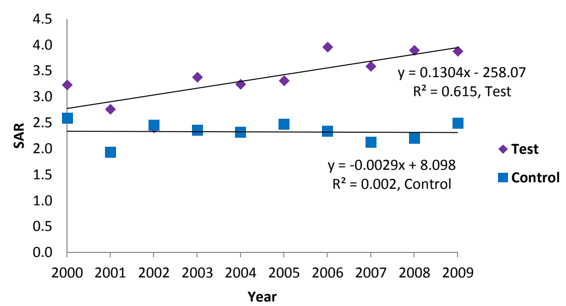
	ECe 12-24"		Ca 12-24"		Mg 12-24"		Na 12-24"		Cl 12-24"		SAR 12-24"		ESP 12-24"	
	Control	Test	Control	Test	Control	Test	Control	Test	Control	Test	Control	Test	Control	Test
2000	0.61	1.80	1.43	5.75	1.40	4.68	3.10	7.30	1.47	2.95	2.58	3.23	2.48	3.37
2001	0.75	2.92	2.13	10.93	2.30	9.03	2.87	8.63	1.27	2.93	1.93	2.76	1.56	2.73
2002	1.04	3.39	3.40	14.00	2.50	10.87	4.10	8.40	3.63	5.57	2.45	2.40	2.29	2.22
2003	2.21	3.94	7.00	14.83	8.50	11.70	6.33	12.30	1.43	9.50	2.35	3.37	2.16	3.58
2004	0.99	2.82	2.90	10.60	3.23	8.47	4.00	9.87	2.37	11.13	2.32	3.24	2.11	3.40
2005	1.32	2.95	3.87	10.45	4.47	9.80	5.00	10.50	1.67	12.95	2.47	3.31	2.33	3.49
2006	1.16	2.93	4.47	10.85	2.73	6.15	4.40	11.55	1.80	13.05	2.34	3.95	2.14	4.37
2007	1.49	3.00	5.67	11.93	4.83	9.27	4.73	11.67	3.20	14.10	2.12	3.58	1.83	3.87
2008	1.87	3.61	6.33	13.90	6.93	9.87	5.60	13.37	4.03	15.47	2.19	3.89	1.94	4.29
2009	1.32	2.94	4.40	10.60	4.03	7.73	5.10	11.70	4.13	12.03	2.49	3.87	2.36	4.26
	0.82093674		0.75189375		0.66333423		0.8583574		0.45255944		0.06854896		0.06697751	

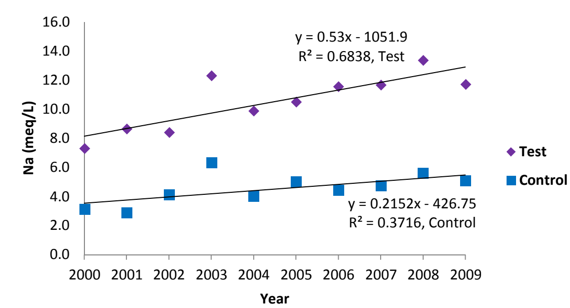
NOTE: Using Control 3 and Test Site 3A

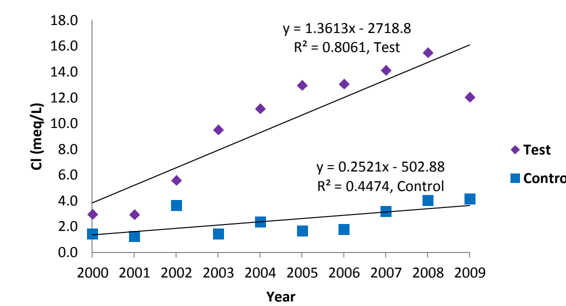


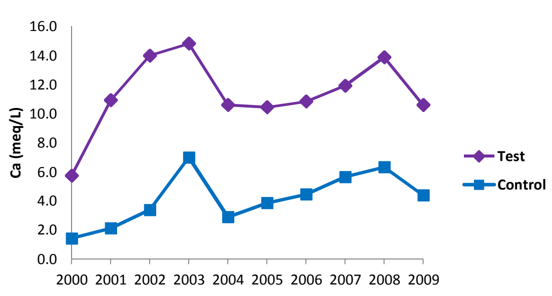


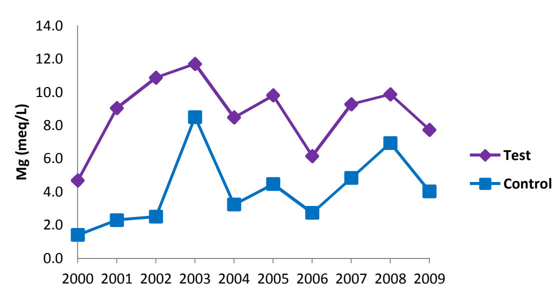


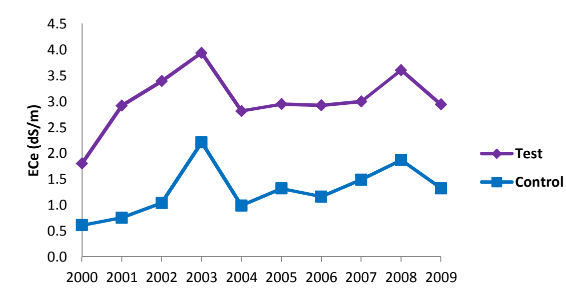


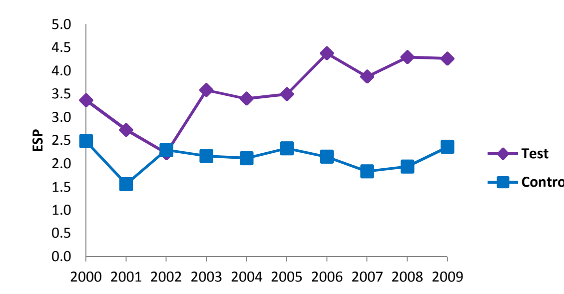


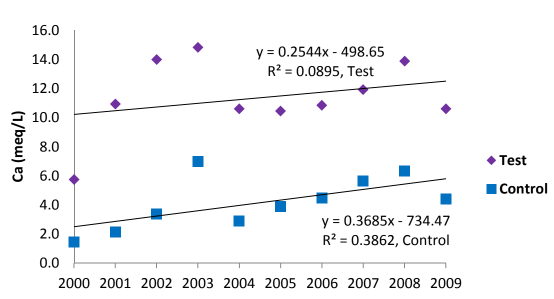


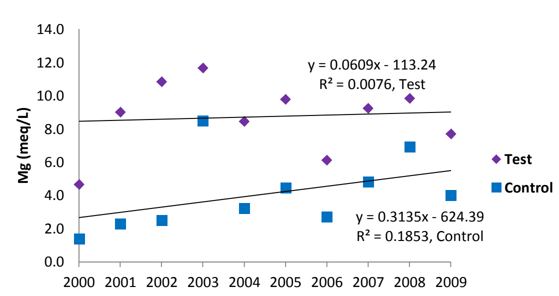


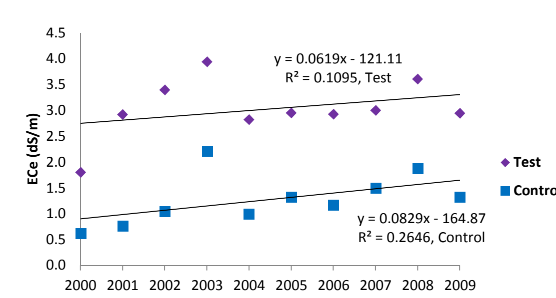


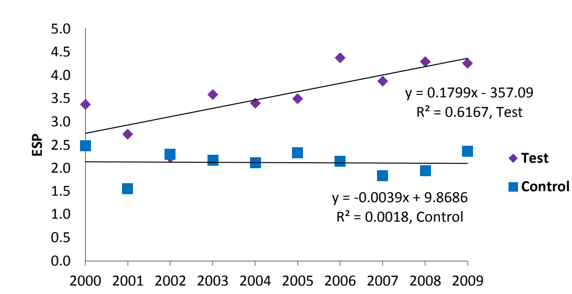








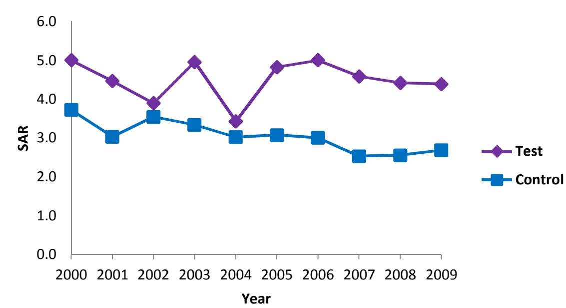


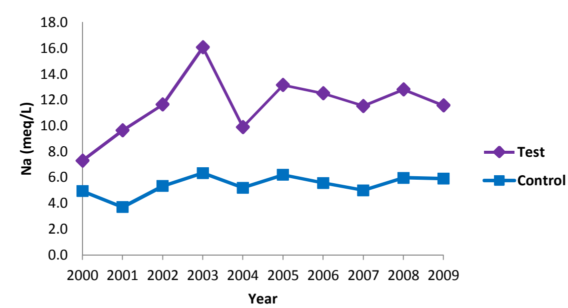


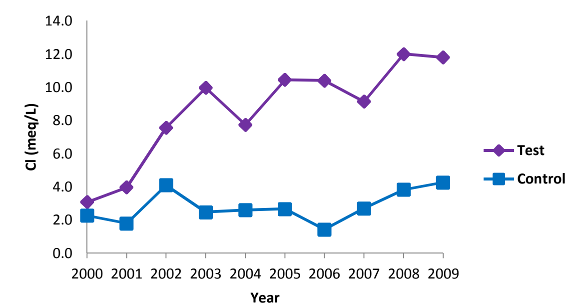
Site 3: Soil Profile 24-36"

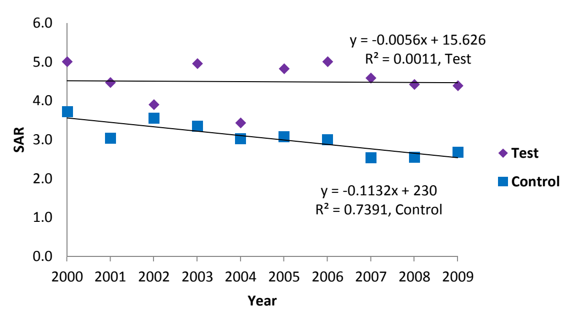
	ECe 24-36"		Ca 24-36"		Mg 24-36"		Na 24-36"		Cl 24-36"		SAR 24-36"		ESP 24-36"	
	Control	Test	Control	Test	Control	Test	Control	Test	Control	Test	Control	Test	Control	Test
2000	0.86	1.30	1.23	3.05	2.33	2.48	4.93	7.30	2.27	3.08	3.72	5.00	4.05	5.68
2001	0.69	2.01	1.53	4.43	1.43	4.93	3.70	9.63	1.80	3.97	3.03	4.46	3.11	5.05
2002	1.00	2.99	2.37	8.43	2.10	9.50	5.33	11.63	4.10	7.57	3.54	3.90	3.81	4.29
2003	1.36	3.69	3.43	10.07	3.73	10.33	6.33	16.07	2.47	9.97	3.34	4.96	3.53	5.69
2004	1.09	2.28	2.60	10.77	3.33	6.90	5.20	9.90	2.60	7.73	3.02	3.43	3.09	3.64
2005	1.46	2.78	2.87	7.25	5.40	7.60	6.20	13.15	2.67	10.45	3.07	4.82	3.17	5.53
2006	1.26	2.44	3.77	8.20	3.17	4.30	5.57	12.50	1.43	10.40	3.00	5.00	3.07	5.76
2007	1.28	2.24	3.10	6.30	4.83	6.37	5.00	11.53	2.70	9.13	2.53	4.58	2.41	5.21
2008	1.67	2.93	4.90	8.37	6.20	8.40	5.97	12.80	3.83	12.00	2.55	4.42	2.44	4.99
2009	1.54	2.54	3.50	8.20	6.30	6.43	5.90	11.57	4.27	11.80	2.68	4.38	2.63	4.93
	0.57925987		0.61017322		0.30317229		0.72604		0.43226026		0.12410559		0.09971197	

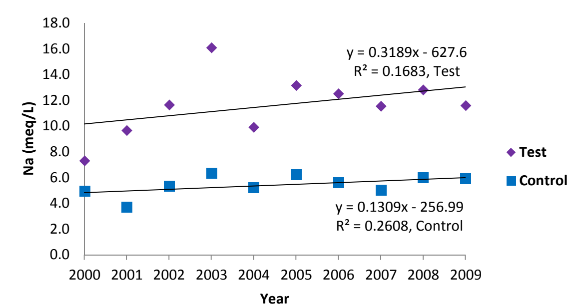
NOTE: Using Control 3 and Test Site 3A

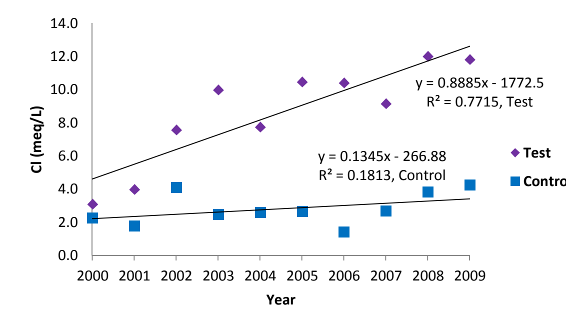


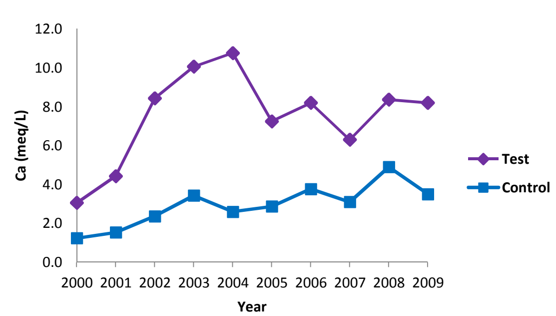


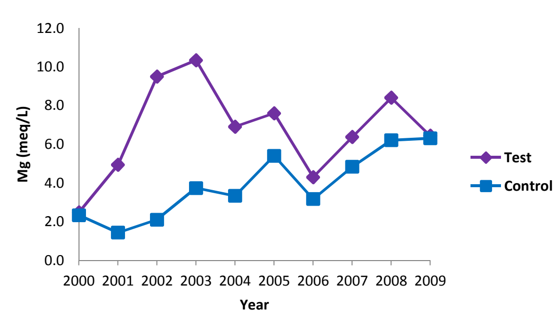


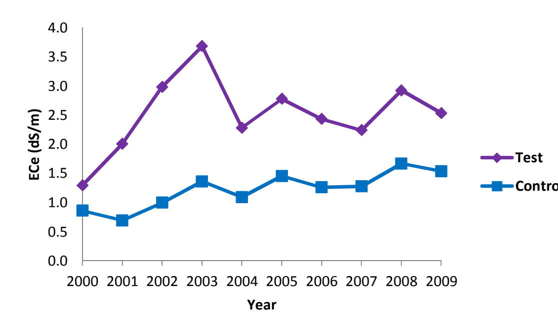


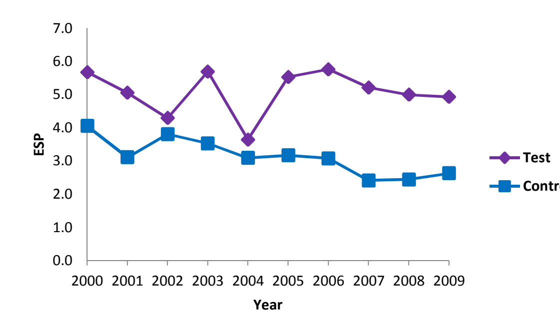


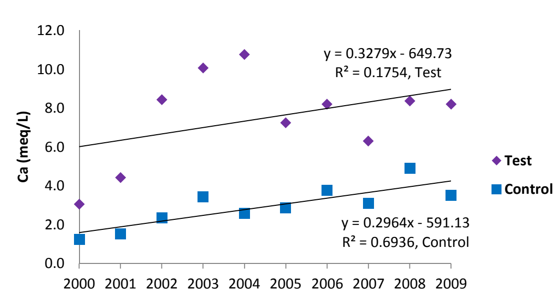


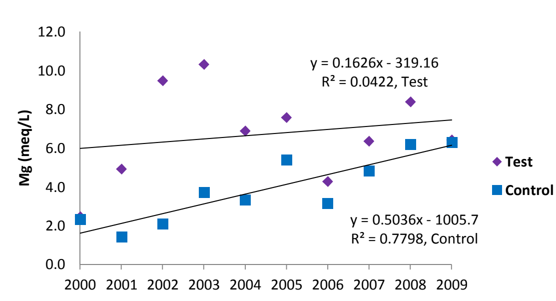


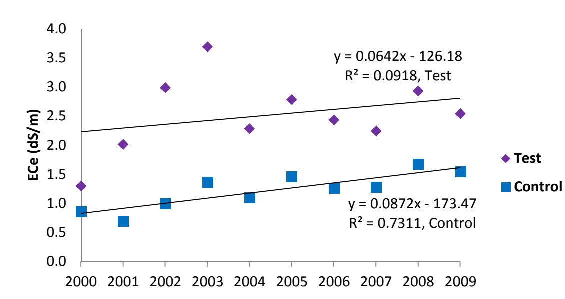


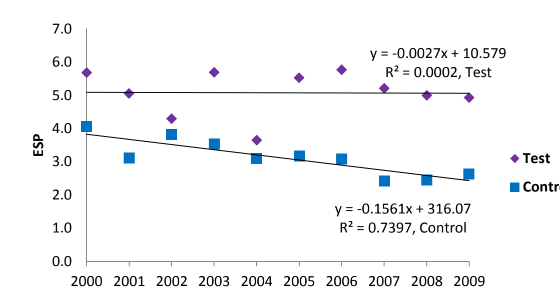








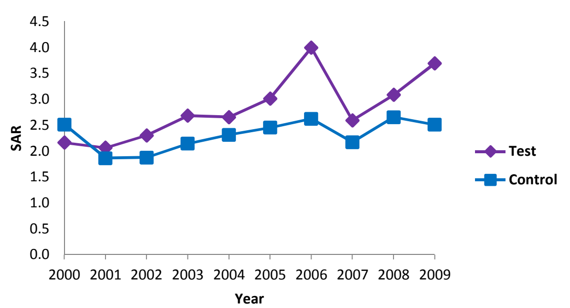


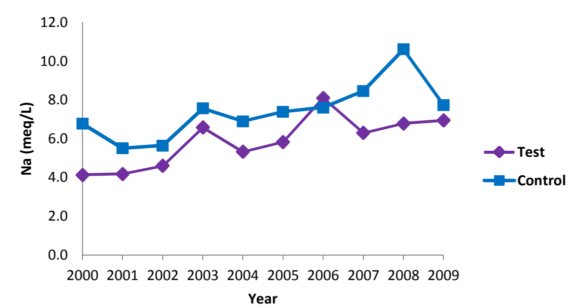


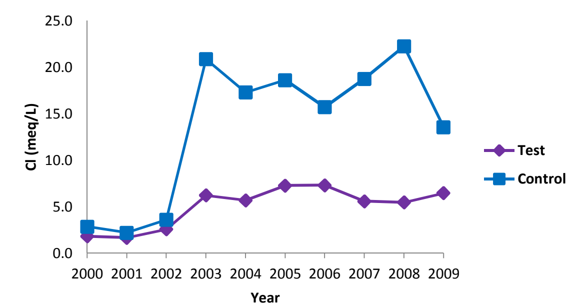
Site 4: Soil Profile 1-36"

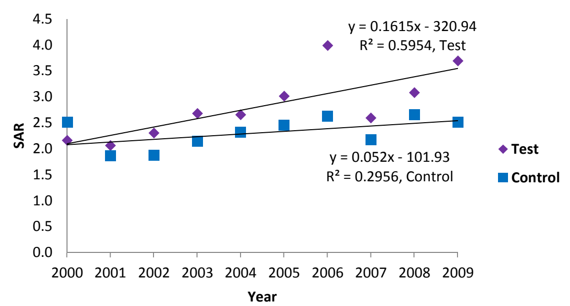
	ECe 1-36"		Ca 1-36"		Mg 1-36"		Na 1-36"		Cl 1-36"		SAR 1-36"		ESP 1-36"	
	Control	Test	Control	Test	Control	Test	Control	Test	Control	Test	Control	Test	Control	Test
2000	2.32	1.25	9.38	4.11	6.87	3.89	6.77	4.12	2.87	1.81	2.51	2.16	2.37	1.89
2001	2.37	1.27	10.50	4.63	7.46	3.66	5.50	4.17	2.20	1.66	1.86	2.06	1.46	1.74
2002	2.45	1.34	10.64	4.94	7.99	3.18	5.64	4.59	3.60	2.57	1.87	2.30	1.47	2.09
2003	3.31	3.33	14.33	7.14	11.04	5.19	7.56	6.57	20.89	6.22	2.14	2.68	1.86	2.62
2004	2.42	1.36	10.53	5.00	8.19	3.68	6.89	5.32	17.32	5.69	2.31	2.65	2.10	2.58
2005	2.52	1.33	11.23	4.75	6.89	3.60	7.39	5.82	18.63	7.28	2.45	3.01	2.29	3.07
2006	2.60	1.78	13.28	6.69	5.12	2.93	7.60	8.10	15.72	7.30	2.62	3.99	2.54	4.36
2007	3.54	1.69	19.20	7.33	10.83	4.61	8.46	6.29	18.77	5.59	2.17	2.59	1.90	2.49
2008	4.09	1.70	20.24	6.01	11.14	4.12	10.61	6.78	22.27	5.47	2.65	3.08	2.57	3.18
2009	2.76	1.36	13.37	4.17	6.93	3.21	7.73	6.93	13.55	6.47	2.51	3.69	2.38	4.00
	0.47389816		0.68851195		0.84173678		0.65014138		0.86569507		0.69248251		0.70291068	

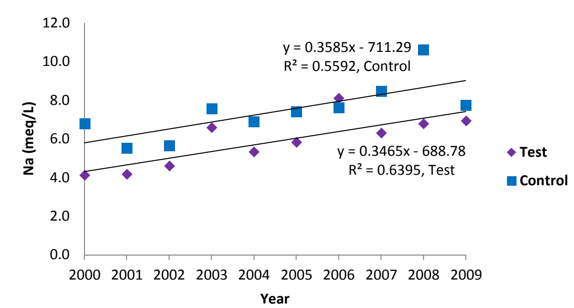
NOTE: Using Control and Test Site 4

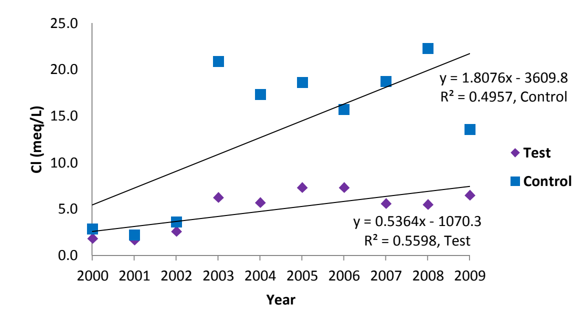


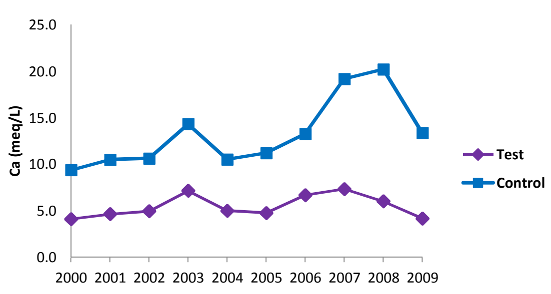


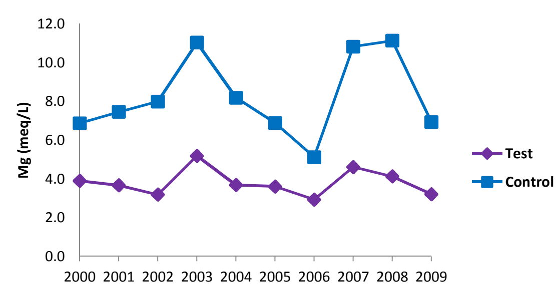


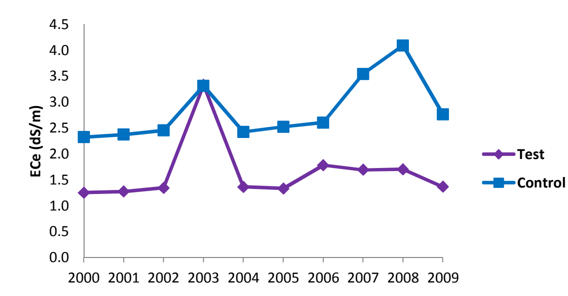


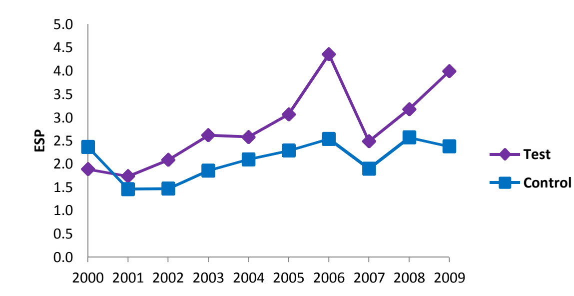


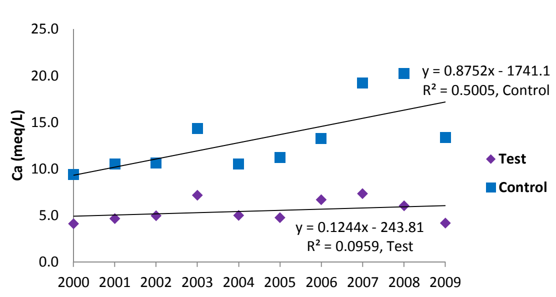


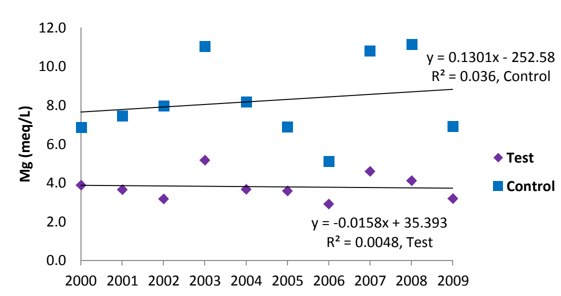


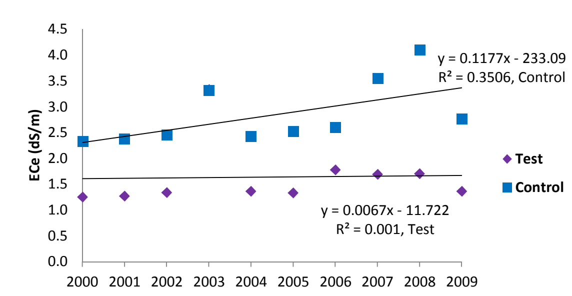


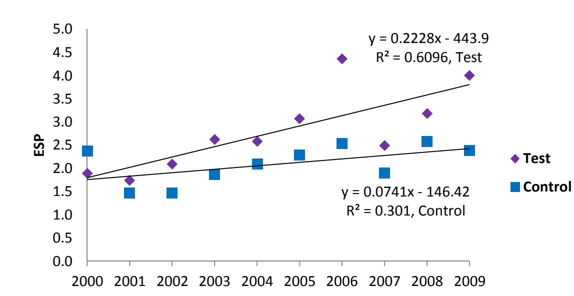








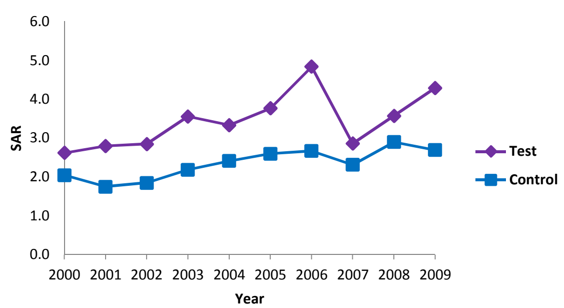


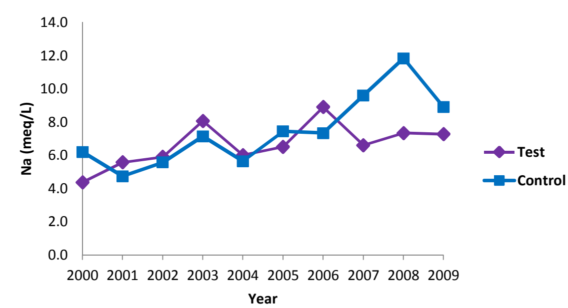


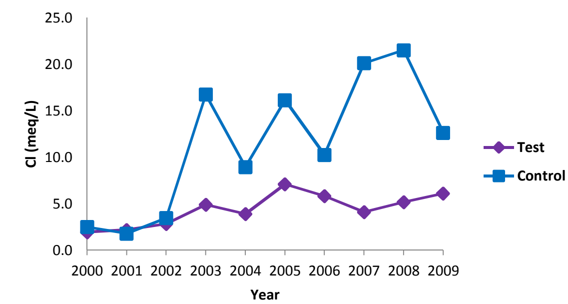
Site 4: Soil Profile 1-12"

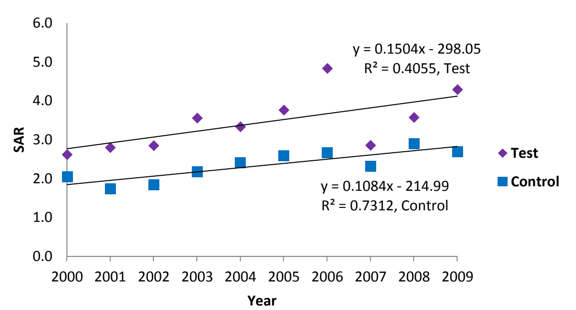
	ECe 1-12"		Ca 1-12"		Mg 1-12"		Na 1-12"		Cl 1-12"		SAR 1-12"		ESP 1-12"	
	Control	Test	Control	Test	Control	Test	Control	Test	Control	Test	Control	Test	Control	Test
2000	2.65	1.02	13.37	3.77	6.60	1.87	6.20	4.37	2.50	1.93	2.04	2.61	1.72	2.53
2001	2.00	1.40	9.93	5.03	5.00	3.07	4.73	5.57	1.80	2.17	1.74	2.79	1.29	2.78
2002	2.49	1.50	12.20	5.90	6.87	2.87	5.57	5.90	3.47	2.83	1.84	2.84	1.43	2.85
2003	2.96	2.99	13.73	7.00	8.40	3.07	7.13	8.07	16.77	4.90	2.18	3.55	1.92	3.82
2004	1.54	1.24	7.13	4.37	3.70	2.17	5.63	6.00	8.97	3.90	2.41	3.33	2.24	3.52
2005	2.37	1.23	10.87	3.90	5.47	1.95	7.43	6.50	16.17	7.10	2.59	3.76	2.50	4.10
2006	2.57	1.74	14.30	6.50	4.43	2.10	7.33	8.90	10.27	5.83	2.66	4.83	2.60	5.50
2007	4.06	1.62	23.00	7.00	10.80	3.83	9.60	6.60	20.13	4.10	2.31	2.85	2.10	2.86
2008	4.28	1.60	21.80	5.37	10.10	3.03	11.83	7.33	21.53	5.17	2.90	3.57	2.91	3.84
2009	3.41	1.21	17.75	3.63	7.70	1.80	8.90	7.27	12.65	6.10	2.69	4.29	2.64	4.79
	0.20269282		0.35730782		0.62419896		0.45288527		0.69272811		0.73895807		0.74626008	

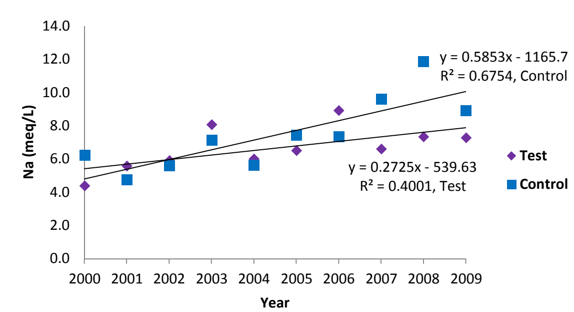
NOTE: Using Control and Test Site 4

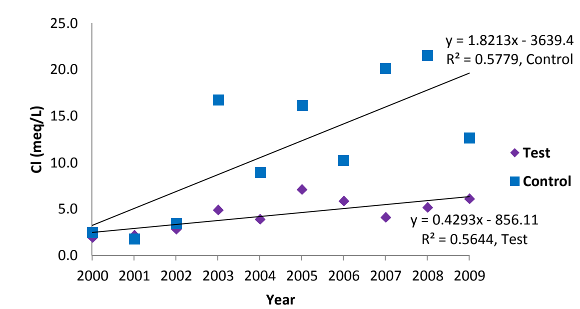


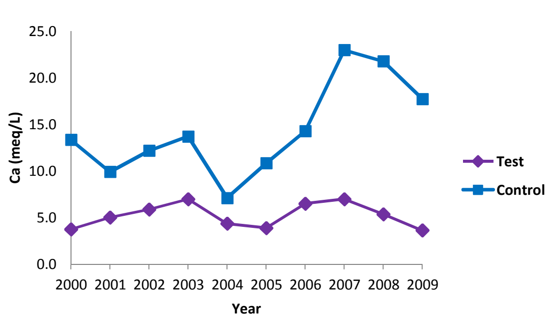


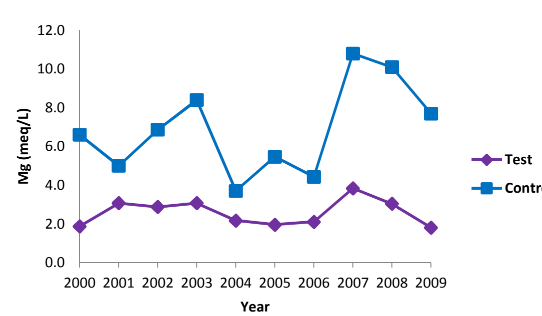


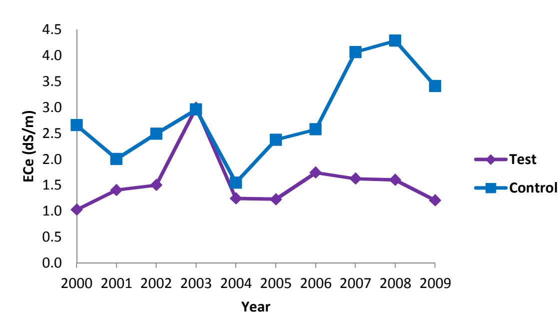


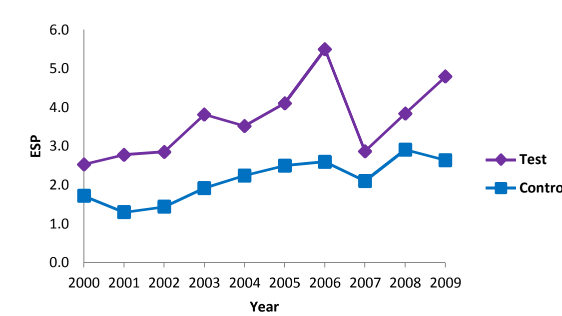


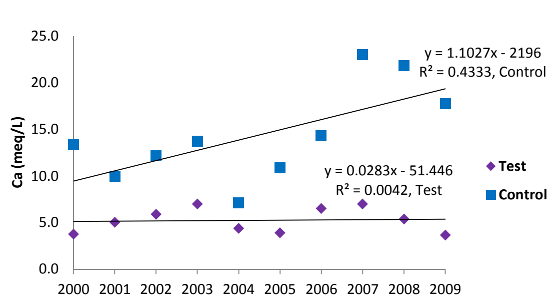


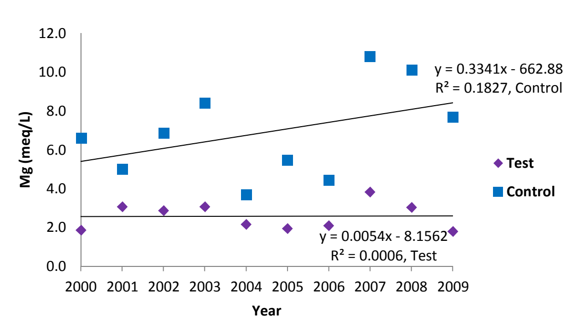


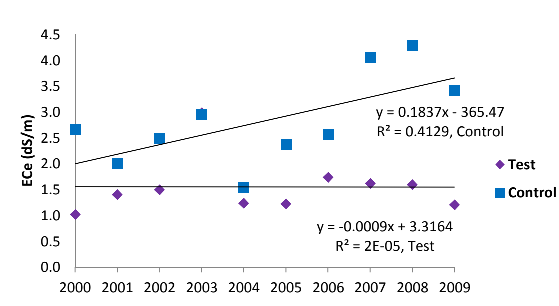


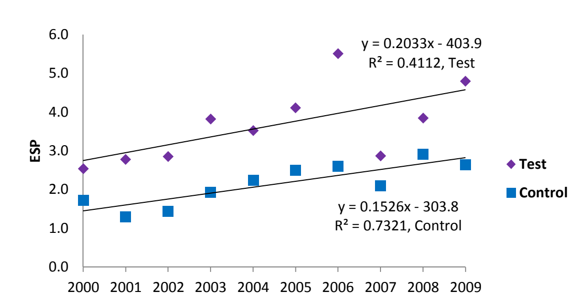








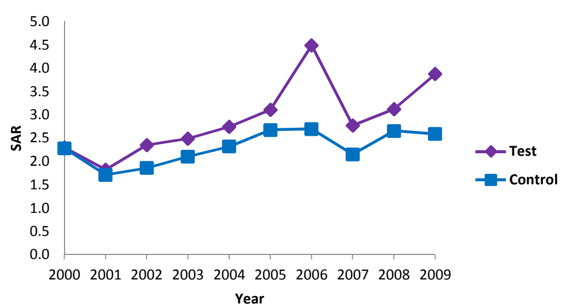


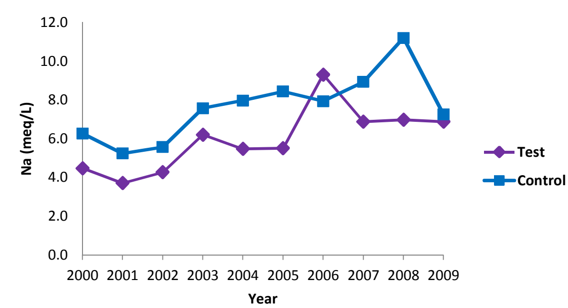


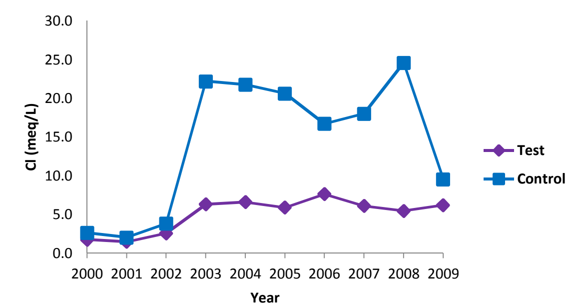
Site 4: Soil Profile 12-24"

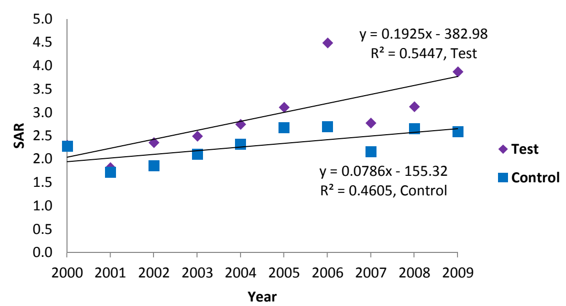
	ECe 12-24"		Ca 12-24"		Mg 12-24"		Na 12-24"		Cl 12-24"		SAR 12-24"		ESP 12-24"	
	Control	Test	Control	Test	Control	Test	Control	Test	Control	Test	Control	Test	Control	Test
2000	2.24	1.38	9.13	3.97	6.90	4.40	6.27	4.47	2.63	1.73	2.28	2.29	2.05	2.07
2001	2.49	1.22	12.00	4.63	7.47	3.70	5.23	3.70	2.03	1.47	1.71	1.82	1.24	1.40
2002	2.38	1.12	10.30	3.97	7.73	2.80	5.57	4.27	3.83	2.57	1.86	2.35	1.46	2.16
2003	3.40	3.71	15.87	7.00	10.43	5.53	7.57	6.20	22.20	6.30	2.10	2.49	1.80	2.35
2004	3.03	1.34	14.20	4.63	9.87	3.50	7.97	5.47	21.77	6.60	2.32	2.74	2.11	2.71
2005	2.74	1.15	12.77	3.60	6.77	2.80	8.43	5.50	20.63	5.90	2.67	3.11	2.61	3.21
2006	2.64	1.90	13.50	6.73	4.93	2.90	7.93	9.30	16.73	7.63	2.69	4.49	2.63	5.01
2007	3.89	1.74	22.17	7.60	12.00	4.70	8.93	6.87	18.03	6.10	2.15	2.77	1.87	2.74
2008	4.47	1.76	23.27	6.43	11.93	4.17	11.20	6.97	24.60	5.47	2.65	3.12	2.58	3.23
2009	2.27	1.27	10.90	3.60	4.80	2.63	7.25	6.87	9.55	6.20	2.59	3.87	2.49	4.26
	0.4093624		0.77711376		0.70666543		0.6120506		0.82203751		0.82291586		0.83064588	

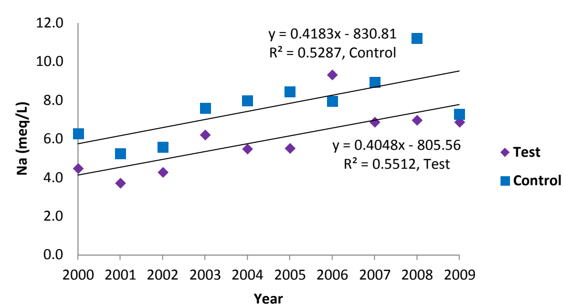
NOTE: Using Control and Test Site 4

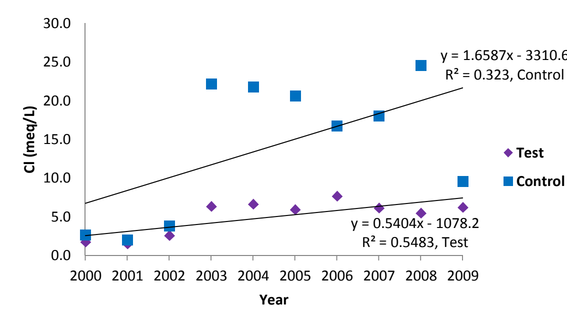


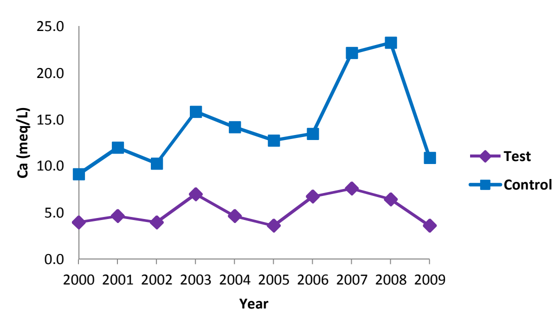


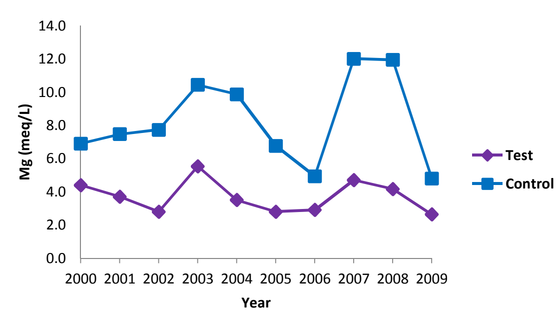


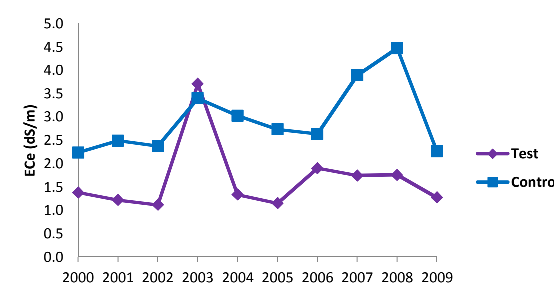


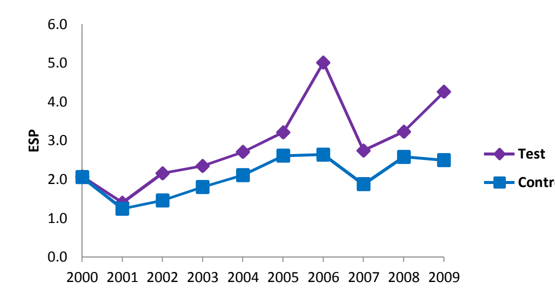


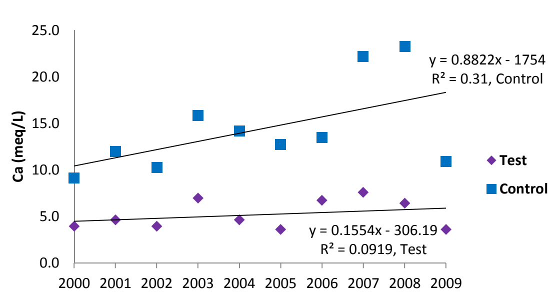


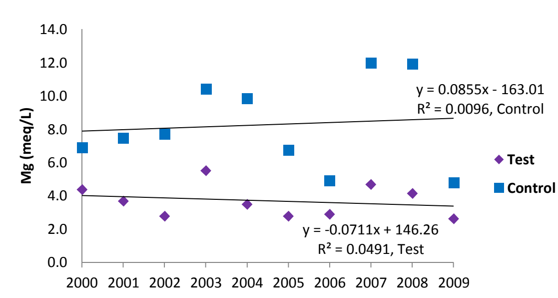


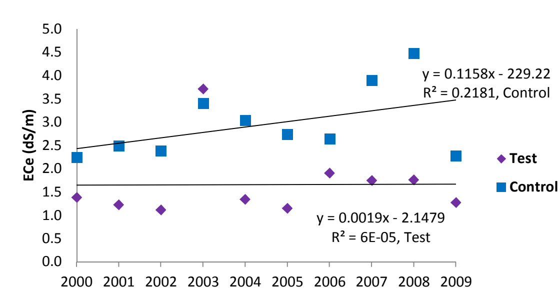


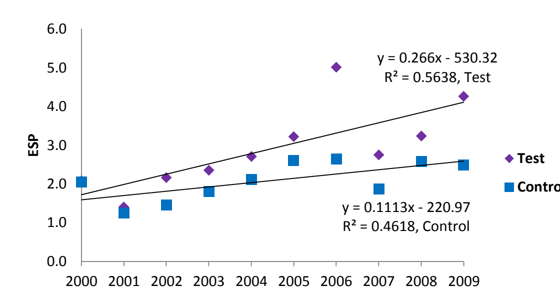












Site 4: Soil Profile 24-36"

	ECe 24-36"		Ca 24-36"		Mg 24-36"		Na 24-36"		Cl 24-36"		SAR 24-36"		ESP 24-36"	
	Control	Test	Control	Test	Control	Test	Control	Test	Control	Test	Control	Test	Control	Test
2000	2.07	1.36	5.63	4.60	7.10	5.40	7.83	3.53	3.47	1.77	3.22	1.58	3.35	1.05
2001	2.62	1.18	9.57	4.23	9.90	4.20	6.53	3.23	2.77	1.33	2.13	1.57	1.85	1.05
2002	2.48	1.41	9.43	4.97	9.37	3.87	5.80	3.60	3.50	2.30	1.91	1.72	1.53	1.26
2003	3.58	3.28	13.40	7.43	14.30	6.97	7.97	5.43	23.70	7.47	2.14	2.02	1.85	1.69
2004	2.68	1.50	10.27	6.00	11.00	5.37	7.07	4.50	21.23	6.57	2.20	1.89	1.94	1.50
2005	2.46	1.62	10.07	6.75	8.43	6.05	6.30	5.45	19.10	8.85	2.07	2.17	1.76	1.90
2006	2.58	1.70	12.03	6.83	6.00	3.80	7.53	6.10	20.17	8.43	2.51	2.64	2.38	2.57
2007	2.66	1.69	12.43	7.40	9.70	5.30	6.83	5.40	18.13	6.57	2.06	2.15	1.74	1.87
2008	3.51	1.76	15.67	6.23	11.40	5.17	8.80	6.03	20.67	5.77	2.39	2.57	2.21	2.46
2009	2.61	1.61	11.45	5.27	8.30	5.20	7.05	6.67	18.45	7.10	2.25	2.91	2.01	2.95
	0.73350011		0.64258022		0.58066836		0.39842068		0.92486061		-0.0807541		-0.0749539	

NOTE: Using Control and Test Site 4